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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLX. No. 3108.] LONDON, DECEMBER 6, 1922. [74TH YEAR. PRICE 1s.

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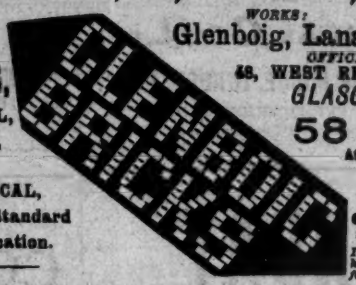

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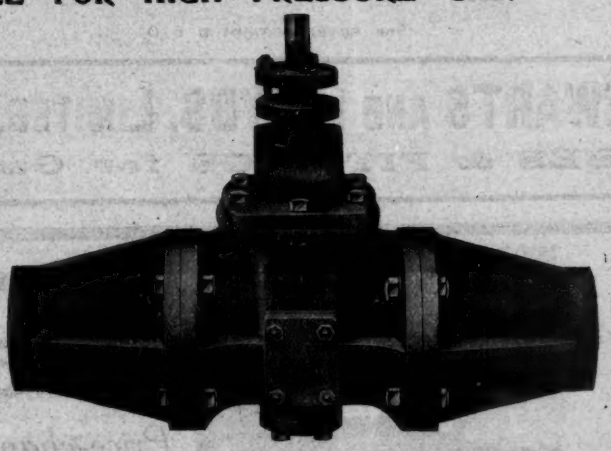

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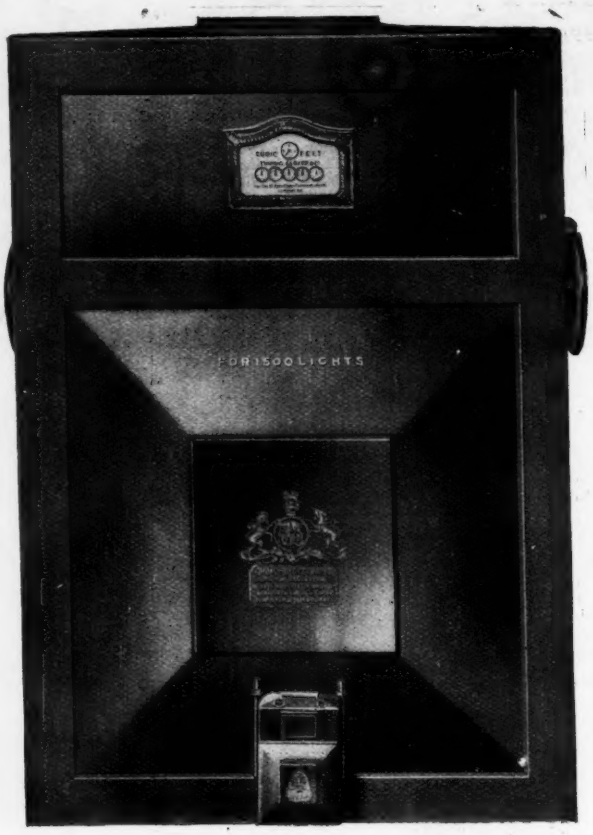

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VOL. CLX., No. 3108.] WEDNESDAY, DECEMBER 6, 1922. [74TH YEAR.

EDITORIAL NOTES.

An Inquiry to be Held.

THE agitators have got their way, and an inquiry into the therm system of charging for gas is to be held. The President of the Board of Trade (Sir Philip Lloyd-Greame) has appointed a Committee, composed, as will be seen from the announcement in later columns, of men of high position in the industrial world. There is not a single gas expert on the Committee. Probably the best that can be said for its composition is that it is such that the public—if there is any part of it now actually interested in the matter—will be pleased to accept it as severely impartial. However, all being men connected directly or indirectly with industrial affairs, they will appreciate the importance of being able to buy fuel on its thermal value. One does not know the exact terms of reference to the Committee, but generally their instructions are to investigate the method of charging for gas on the thermal basis. This does not suggest any opposition to the thermal basis as such, but simply that the question is whether or not it is a basis that is fair as between consumer and supplier. This will have to be tested by comparison —by comparison with what preceded the introduction of the therm system—and we have no fear that the Committee will find, as the Fuel Research Board found, that the change to the therm basis was a desirable one in the interests of the public.

Beyond this it is difficult to know what the Committee will have to inquire into. They are not, however, likely to have their vision obfuscated by the argument that the gas, being measured in cubic feet, should be charged for by cubic feet. A 1000 c.ft. of 500 B.Th.U. in one district equals 5 therms; 1000 c.ft. of 450 B.Th.U. gas in another district only equals 4½ therms. The public therefore require to be defended from any suggestion or belief that 1000 c.ft. in one district is the same thing as 1000 c.ft. in another district. And this protection the Gas Regulation Act ensures by double measurement—the cubic feet measurement on the consumers' premises, and the heating value measurement by the examiners appointed by the local authorities representing the public—the suppliers then charging for the gas at per 100,000 B.Th.U. supplied. Really, it seems to us there is very little, so far as the therm system is concerned, which requires investigation. Under the system, the price of gas is descending; and complaint seems to have lost all foundation—other than in the minds of one or two editors of daily papers, who have given ample testimony that their knowledge of the subject is infinitesimal. Nothing would give the gas industry more satisfaction than to have those editors placed under cross-examination upon this question of the therm basis. There are also some members of the London County Council who are always opposed to private enterprise engaging in public services, and who take advantage of any current of wind opposed to such private enterprise. It is the London County Council who have latterly been pressing for an inquiry; but it has been acknowledged that they themselves as consumers have no cause for complaint. They are representing the public in the matter. But what matter? Something obviously without any substance, other than a well-fanned flame originally set going—not by an epidemic of high gas accounts—but by scattered ones, such as more or less always exist, but are naturally accentuated when the price of gas is high through the incidence of abnormal costs. Since the agitation, gas accounts have fallen through the reductions in the price per therm—not as a consequence of the agitation, but of the easier conditions in respect of costs. At the same time, it must not be forgotten that the price of coal is still some 100 p.ct. higher at the collieries than before the war, while prices of gas are in the London area only some 50 to 60 p.ct. above pre-war figures.

The more one analyzes the position, the less there appears to be to inquire into. Who are to be the witnesses on the side of the "public," we have no notion. At any rate, there will be interest to the gas industry in knowing what they have to say, and to ascertain whether there is actually anything of which we have no present knowledge that can be advanced against the principle of charging on the heat-unit basis. The gas industry, of course, will be represented at the inquiry, and will put up a representative case.

The Confusion of the Consumer.

WE should not be surprised if the Ministry of Transport is soon asked to hold an inquiry into the height of electric lighting charges in some of the Metropolitan areas, and the diversity of tariffs that at present have sway under different electrical administrations. The gas industry has had its turn at being pilloried by certain newspapers and discontented consumers over the new system of charging for gas by the heating value supplied. In the agitation electrical hands helped to swell the newspaper correspondence in the ungracious attempt to inflate for self-interest the discontent. Now it is the turn of the electricity industry. Last week the "Daily Telegraph" had two special articles on "Lighting Bills: Are They Too High?" as well as an editorial article on the subject. These showed that, among retail traders especially, there is extensive dissatisfaction over the maintenance of electric lighting rates by the supply companies, as well as over the divergencies between company and municipal charges, and further regarding the fearful tariff complications that exist in most supply areas, and which, for the effectual confounding of the consumers, positively put into the shade the gas industry's two flat-rate charges at per therm or per 1000 c.ft. The articles were directed principally to electricity, and gas only came in for incidental reference. The writer did not take up any dogmatic attitude; but the complaints of too high charges were clearly presented from the point of view of the plain man who does not know anything of the intricate factors that go to make up the charges in different areas, and which account more or less for the differences of price as between one area and another—even adjoining ones.

In making comparisons between the increase of charges for gas and electricity, there are various important points that should be borne in mind. Between electricity and gas, there is nothing comparable in the factors which constitute the charges. In the case of electricity, for example, generating costs may be taken, roundly speaking, to be 25 p.ct. of the total outgoings; the remaining 75 p.ct. being represented by capital charges, rent, rates and taxes, and salaries and wages. In the case of gas, the capital charges are lower, and more has to be spent on salaries and wages, per unit of production; and whereas from the coal used the electricity industry has only one product, the gas industry is the maker of several—gas, of course, being the primary one, while the variable income from the secondary products goes to reduce the net cost of the coal for the manufacture of the primary product. Just now the markets for these products are, through the depression in trade, in fairly low water; and this partly accounts for the fact that, good as have been reductions, the prices of gas cannot be lowered at even faster pace. Without going further, the incomparability of the factors as between gas and electricity are evident. The consumer does not appreciate these points; and

his views are reflected by the articles in the "Daily Telegraph." It is admitted by the writer in our contemporary that the prices of gas and electricity did not, during the war and after, soar quite to such heights as some of the other essentials of life. This being so, it is curious why they should have been selected for the attacks of the public and the Press. The articles are based on the complaints of large traders as to the reluctance of their lighting bills to descend. It is agreed by the writer that they cannot recede to pre-war figures in present circumstances, and this agreement is based on the ground that wages are still in advance of the old rates, and so are likely to continue to maintain beyond the pre-war normal the charges to consumers. Some of the discontented trading firms are the owners of retail shops in different areas; and they should bear in mind that one of the reasons that wages, and therefore lighting charges, are still in advance of the old rates, is that the patrons of their shops for food and clothing have to pay for them prices far in excess of the pre-war ones. This, however, will not be regarded as sufficient explanation. They point to coal having been considerably reduced during the past twelve months. They are manifestly men who concentrate on one factor, and neglect all the other contributory ones. We have pointed to some of these in referring to two outstanding differences between gas and electricity in the making of prices. Everything that has increased in price—coal, oil, and other manufacturing materials, rents, rates and taxes, structural materials, and labour—as well as the shrinkage in the market values for (in the case of the gas industry) secondary products, must be included in trying to come to a fair judgment in this matter. Thus it is a mistake to complain of the present cost of either gas or electric lighting on the ground alone that the cost of coal has descended.

The articles refer to the big difference there is in prices as between electricity for lighting and for heating and cooking. The complaints are in respect of lighting bills. It may interest the complainers to know that the lower charges per unit for heating and cooking are only made possible by maintaining the lighting rates. It will be seen from our "Electricity Supply Memoranda" this week, that Mr. J. W. Beauchamp, the Director of the Electrical Development Association, has been laying it down that there is little need to trouble about electric lighting rates, and suggesting that it is excellent policy to maintain them in order to favour the other branches of the business. He apparently considers that the lighting consumers are already getting good value for their money; the lighting consumers, having to pay, may be allowed to have their own opinions on that point. Also his view is that it is a matter of expediency to bring down as low as possible the rates for the other branches of business, in view of the robust character of the competition against electricity. In this connection, there is an extraordinary diversity between the charges for electricity for different purposes in different supply areas. These dissimilar charges are not due to municipal administration on the one hand and company administration on the other. They are mostly attributable to the differences in the character of the district, and therefore in the demand for electrical energy. For example, in the East-end of London there is a good industrial load, which helps to level the output curve; whereas in the West-end, the bulk of the business is done in the few lighting hours, and thus costs are piled-up on the one service instead of being distributed. Therefore uniformity of charges for particular purposes are impracticable. But what is highly confusing to the consumers generally is the diversity of tariffs. However, in all this controversy, we do not see that consumers give the gas industry any credit for the enormously increased value in illumination they receive for money paid in comparison with the days of flat-flame lighting, nor to the electricity supply industry for the additional value in illumination for money paid in comparison with the days of the carbon filament lamp. Again, the consumers persistently overlook the fact that the London Gas Companies and many others can only increase their dividends by reducing the price of gas per therm; the electricity companies are under no corresponding obligation. Although the articles in the "Daily Telegraph" do not do much to elucidate the position from the consumers' standpoint, they do show that the electricity industry should set to work to devise means whereby the consumers may be placed in the position of being able better to comprehend the lines on which electricity trading is carried on. Multiplicity of tariffs based on (to the public) incomprehensible factors only confuse them. Those tariffs want to be scrapped, and something simpler established. But we should hesitate, in view of the inefficiency of electricity generation, to recommend the electricity industry to charge by the therm.

An Electric Flow Meter for Gas-Works.

FOR precise gas registration, the ordinary drum type of station gas-meter will want a lot of displacing; but the processes and operations of gas manufacture have so extended that a less expensive and less bulky form of meter can do good service in supplying information as to passing volumes, where approximate accuracy suffices. Mr. John Terrace, the Chief Engineer of the South Suburban Gas Company, introduced to the members of the Southern Association last Thursday week, the "Electro" flow meter, a sample of which has been in use and under critical test at one of the Company's works. This meter is destined to supersede an overloaded one of the drum type, which is used to measure water gas. It will be seen from the paper, and with striking emphasis in one of the illustrations, that the meter is small in comparison with one of the station meter type to perform the same service—in fact, the same size "Electro" flow meter is used for all quantities; the only difference being in the balance weight on the bell. The station meter in the illustration is a 30,000 c.ft. per hour one; but the same size "Electro" meter would be used if the flow was 60,000 c.ft., or any other figure. The meter and its working are described in the paper. A disadvantage is that the indicating and recording instruments do not supply their information in cubic feet; and anything that goes away from that will not be regarded with any particular favour by the man in charge. As Mr. Terrace says, if the quantity of gas could be kept within the range of the indicator and the specific gravity were constant, indication in cubic feet could be arranged. That is the trouble; those factors are not constant, and cannot be. As the hourly quantity of gas to be measured in winter greatly exceeds that in summer, and it is undesirable to alter the size of the orifice plate of the flow meter, it is more convenient to multiply the readings by a factor, which is varied according to (*a*) the specific gravity, and (*b*) the weight used on the bell—different ones being used for summer make and winter make—and the temperature and barometric pressure. Specific gravity is especially important, with the addition of varying quantities of water gas to the coal gas, and the flow meter in use on the mixture.

The meter has been subject to very critical tests. Testing it without a voltage regulator, the daily record showed that the difference in registration between the station meter and the flow meter over a period of two months was 0·81 p.ct.; after fixing the voltage regulator, the difference over a period of 36 days was only 0·3 p.ct. This is close agreement. In making comparative tests with a meter of this kind, there are points that require to be carefully observed in order to ascertain how the meter will function under the changeful conditions to which it will be subjected on a gas-works. In the first place, it should be tested for a fairly lengthy period. Secondly, the total make of gas should not be uniform—there should be big variations. For example, on one of the diagrams submitted by Mr. Terrace, it was noticed that, in the tests described, on one day (July 26) the make was 800,000 c.ft.; whereas on another day (Aug. 8) it was down to 518,000 c.ft. A wide difference of this kind enables one to ascertain whether the flow meter is capable of following considerable variations in volume with the same ease as a station meter. The results show that it is. Then, as Mr. Terrace points out, specific gravity is an important consideration. Therefore it is advisable in testing such a meter to vary the specific gravity by altering the percentage of blue water gas or carburetted water gas in the mixture. This was done in these trials. In them, the lowest specific gravity recorded was ·462, and the highest ·529. In all meters of this kind, whether the differential pressure is obtained by the use of an orifice plate (as in this case) or by a Venturi tube or a Pitot tube, the specific gravity plays an important part. A variation in specific gravity of ·450 to ·550—a difference of 0·1—makes in the registration a difference of approximately 9·5 p.ct. On higher gravities, it would be less than 9·5 p.ct.; on lower gravities, more—that is for a difference of 0·1 in gravity. This also applies to gas delivered by a main. The point is a very material one, and one which we think has been rather generally overlooked. Mr. Terrace, however, refers to it in his paper.

In connection with the description of the working of the

flow meter, the author also alludes to the simple gas-sampling apparatus, which in its original form was noticed in the "JOURNAL" for Nov. 9, 1921 (p. 433), and Nov. 16, 1921 (p. 505), but which has since been improved in certain details. This supplies a regular representative sample of gas made throughout the twenty-four hours, and should be very useful on every gas-works. It is from the sample of gas thus obtained that the specific gravity required in obtaining the correction factor is ascertained—the receiver giving a sufficient quantity of gas for a calorimetric test, an analysis, and a specific gravity determination. The information as to the meter and the method of obtaining gas samples will no doubt attract very considerable attention from gas engineers, who are always on the alert for aids to more efficient control. The great point about the meter is that its indications approximate so closely to the registrations of an ordinary station meter. This is proved by the very thorough tests over a considerable period at one of the works of the South Suburban Company.

The Gas-Electrical Engineer.

THE gas engineer of to-day has to be a man of many parts. There cannot be any evasion of a recognition of this when the diversity of processes and operations on a gas-works are considered. The gas engineer and manager has not only to be, if he is properly qualified for his work, a man who is competent in gas engineering and management, but within a certain range he must also have chemical and electrical knowledge. As to chemical work, we know that the view is held in some quarters that this can be deputed to some man who has been specially trained in it. One does not, of course, expect a chief gas engineer to carry out the routine duties of a works' chemist; but we do hold that no gas engineer and manager is perfectly equipped for his responsible position unless he is qualified to give some supervision to the work of his chemist or, in the case of a large works, of the chemical staff. The same applies—we will not say equally, but (if at all) little short of it—to the electrical operations on a modern gas-works. Several of the vital mechanical functions of the gas manufacturing plant to-day depend on electricity—this due to the convenience of electrical energy owing to the character of the work to be performed, and the scattered disposition of the plant. Every gas engineer should know a great deal about electrical plant and its operation, for like reason to that mentioned in connection with chemical duties—that he should be able to give proper supervision to, and have adequate control over, the work of the member or members of his staff to whom the electrical plant is entrusted. This shows that the gas engineer of to-day must have knowledge that extends well into other professions than his own. No young aspirant for gas-engineering position can hope to reach the apex of engineering and managerial responsibility unless he has also chemical and electrical qualification.

A great deal of attention is being paid just now to the gas industry from the electrical point of view. This, in the first place, because of the development through the local gas-works of electricity supply in districts where there has hitherto been none—this being the only way in which there can be profitable installation of the service. In the second place, gas-works, owing to their modern characteristics and power requirements, have become important customers for electrical plant—not only for motors, but for generating plant, for which gas-engines are mostly the prime movers. Moreover, the electrical equipment of gas-works, owing to the conditions which exist in them—the heavy work in retort-houses equipped with charging and discharging machinery, the dust and dirt (particularly in the neighbourhood of the coal and coke handling plant), and fumes (especially those of a sulphurous nature)—is a matter that experience declares requires very careful consideration and selection, and, when in position, very scrupulous attention in order to preserve it from undue deterioration and in good working condition. It is costly plant, much depends upon it, and reliability and economical working with it are not to be obtained by letting it take care of itself. Therefore, the responsible engineer should know his electrical plant as well as he knows his carbonizing plant, for it is an integral part of the manufacturing system under his charge. Although the chief engineer is (as he should be) competent to supervise and control the working of the electrical plant—generating, distributing, and motive—he cannot be expected to undertake the hour-by-hour supervision and control. For this purpose, he must have a member of his staff who is also specially qualified for the work.

Very good reasons are submitted for this in an article which has appeared in "Electricity," by Mr. James Tyler, on "The Gas-Works Electrical Engineer." It is the first time that we remember seeing an electrical paper acknowledge, directly or indirectly, that a gas-works is a suitable place for a young electrical engineer to seek employment. Mr. Tyler, who has had many years' experience of gas-works electrical equipment, makes no secret of his view that young men who have taken up electrical work might do worse than enter the ranks of those electrical engineers who are serving the larger gas undertakings. He shows that the work is interesting through variety of duty, and its association with gas making processes, about which it is necessary for the electrical man to know something in order to get the best out of the electrical plant under his care, and in order efficiently to protect and maintain it. Mr. Tyler, in sketching an appropriate course of training for a gas-works electrical engineer, also indicates that the position is a highly responsible one. His advice as to the best method of getting a start is to serve (say) three years in a mechanical workshop; then spend two years between armature winding, motor repairs, and wiring of a heavy works description. Following this, he prescribes a situation as junior electrician in a gas-works, until the aspirant has become familiar with the gas processes—their requirements and effects. He advises the spending of two years as a junior. By that time a very liberal education in gas-plant engineering would have been obtained, which is necessary seeing that the work comprises so many different types of drive, and many varied problems.

That is true. Electric motors on a gas-works are employed for widely varying purposes, and therefore under very different conditions. The work, generally speaking, is hard; and it puts to severe test the abilities and strength of the electrical plant installed. In view of this, close attention has to be paid to design and installation; and location is of no small importance. In the design of all parts, quick repair and replacement are vital. Gas-works cannot afford to have breakdowns—particularly of the exhauster plant. The question of reliability is a paramount consideration, and that is why the gas engineer prefers to have his own generating plant, and generally in duplicate, as it would be rather an awkward thing for a district if a cessation of the town electricity service also brought a stoppage to the operations at the gas-works through the cutting-off of the electrical energy. In some instances, Mr. Tyler finds that duplicate motors are installed served by separate circuits, in order that there shall be no breakdown. The orthodox electrical engineer will receive some rude shocks with respect to the special electrical methods on gas-works. Mr. Tyler, for instance, states that no fuses are permitted to motors, either at the point at which they work, or on the switchboard, nor are the main generators protected by fuses or overload circuit breakers—the reason being that the exhauster motors must not stop. While the average electrical man would find his hair rising when brought into contact with such methods of working, Mr. Tyler says they are not so foolhardy as appears at first sight. All circuits, other than the exhauster and compressor motors, are fitted with overload circuit breakers, which are kept in first-class order. The motors, too, at vital parts of the plant are usually equal to some 10 p.ct. above their required duty, and every precaution is taken against breakdown due to dust or dirt. The result of all this is that Mr. Tyler is able to state that plants under his supervision have been running ten years, despite electrical transgressions, without any untoward happening. Of course, this would not be the case if there was not scrupulous inspection and maintenance of the plant. However, for the electrically trained young man Mr. Tyler knows of a no more interesting "job" than the charge of gas-works electrical plant, and with developments in the industry he sees good prospects.

Suitable Habitation for Generating Plant.

A PAPER which has some relation to the foregoing was published in last week's issue of the "JOURNAL." It was on the subject of "Motors for Use in Gas-Works," the author being Mr. G. E. Mason, of the Lancashire Dynamo and Motor Company, Ltd.; and the paper is being read to-day on the occasion of a visit of the Manchester and District Junior Association to that Company's extensive works. In

the preceding article, reference is made to the difficult conditions under which motors have to operate in gas-works—conditions which are, unless great care is exercised, calculated to assail motor stability and smooth running. The manufacturers of plant who have made a special study of gas-works circumstances and requirements have succeeded in their work of protection to a very large extent, in respect of dust, dirt, and sulphurous fumes, which last-named attack, and have a bad effect upon, the insulation. But what the manufacturers have done requires to be seconded by the gas engineer, by providing suitable accommodation for the plant. We have seen electricity generating plant installed in the dusty atmosphere of a retort-house, with nothing but a leaky wooden structure surrounding, which gave ill protection from dust, steam, and fumes. But it is surprising to learn from Mr. Mason that the error has been committed of installing a "number" of these generating stations in purifier houses; and naturally trouble has occurred through sulphur affecting the insulation. Really we cannot imagine an engineer, unless extraordinarily hard-pressed for space, selecting such a place as a habitation for electrical plant. We are afraid such a mistake originally occurred through the gas engineers not being electricians, and the advising electricians not being gas engineers. Now all concerned know better. If there is any part of gas-works apparatus for which the best possible accommodation, and therefore protection, should be afforded, it is the electricity generating plant. It is costly plant, fairly easily put out of working order, and much depends upon it in respect of the mechanical operation of the ordinary gas-works processes. The paper by Mr. Mason will be generally useful; and we have no doubt as to the educational value of the visit to his Company's works of the assistant engineers who largely constitute the membership of the Manchester and District Junior Gas Association.

The Standard Cooker.

This matter is only in a state of temporary abeyance. The position is that there are still a few firms who have not yet submitted their tenders for patterns and jigs and sample cookers. A number of tenders have been received; but the opening and examination have been deferred until the Central Executive Board of the National Gas Council are in possession of the whole number. It is probable we shall hear more about this matter before the end of the year.

Price of Gas in Germany.

Consumers who were complaining recently of their gas accounts, with their prices at 11d. or 1s. per therm, should be interested in the current charges for gas in Germany. In Frankfort, the present price is M.52 per cub.m., which is equivalent at the pre-war rate of exchange to £73 per 1000 c.ft. As an abbreviated translation of an article from a Frankfort newspaper informs readers, an economical housewife using 2 cub.m. of gas per day incurs a monthly outlay of upwards of M.3000, equivalent at the pre-war rate of exchange to £150. This month the price of gas in Berlin is to be M.90.

Gas Coal Position.

From all markets come buoyant reports as to the gas coal business being done. Particularly for the best classes, there is excellent strength in Durham and Northumberland. In those quarters there is nothing superfluous in the way of supply this side of the end of the year, though occasionally a few odd parcels are to be had. Business from abroad has put Yorkshire in a strong position in regard to gas coal, with the result that second classes are selling for immediate absorption at home at better prices. The collieries are very busy meeting the demand for the best screened sorts. Under contract, larger quantities of gas coal are being delivered from Derbyshire, and in the open market there business is being done of good order for stock enlargement. Generally speaking, this reflects the position in other fields.

Smoke Abatement.

As previously intimated, the feeble Smoke Abatement Bill that the late Government introduced last session is not likely to be revived. But it is probable that something entirely new will be evolved. A question on the subject was asked in the House the other day; and it was stated that the Government would consider the introduction of a Bill next session. Sir H. Brittain was the interrogator. In conjunction with the question as to the steps the Government propose to take to mitigate the evil of fogs, he put an arithmetical problem, which even the Government, with all their resources, cannot tackle. It was as to whether any financial computation had been made regarding the loss suffered by the Metropolis, in addition to the effect on the health of the citizens, by the recent series of fogs. Financial losses are incurred through fogs in so many directions, and the population of London is so enormous, that the question defies any answer that would be sufficiently exact to be passably acceptable.

Railway Rates and Steel Making.

The decline in railway rates proceeds with gentle steps, following on the persistent pressure from influential sources. The English railway companies last week issued a statement announcing further reductions as from Dec. 1; but these only apply to materials required for blast-furnaces and steel works. For these, in respect of the carriage of coal, coke, and patent fuel, the present maximum addition of 3s. per ton (where now applicable) is to be reduced to 2s. a ton. There are reductions in the cost of the carriage of raw materials required in the manufacture of iron and steel, the effect of which is that materials in class "A" will have the maximum addition reduced from 2s. to 1s. per ton, and in class "B" from 6s. to 4s. per ton. On iron and steel in class "C" of the general railway classification, the present percentage increase of 75 p.ct. is to be reduced to 60 p.ct., *plus* a flat rate of 4d. per ton—the maximum increase to be limited to 8s. per ton. The other day at Middlesbrough, Viscount Furness stated that whereas the price of steel is only up 13 p.ct. compared with 1913, the cost of coal is higher by 77 p.ct., and railway charges on a ton of steel by 73 p.ct. In the depressed state of trade, demand can only be stimulated by reducing prices. Consequently a substantial recession, both in coal prices and railway rates, is imperative in the immediate future if the steel industry is to recover its position in the markets of the world.

Advance in the Price of Iron.

Notwithstanding the foregoing reductions in railway rates, for the first time for two years there has been an advance in the net selling price of iron. While it is only 1s., it is regarded as a symptom that the downward movement has been arrested. Since last year the average selling price has fallen by nearly £23 per ton. There is an automatic increase in ironworkers' wages of 2½ p.ct.

Unemployment Insurance by Industries.

This question has again been raised by the Minister of Labour (Sir Montague Barlow) addressing a letter to the National Confederation of Employers' Organizations and the Trade Union Congress. The exploration of the matter is with the view to establishing an improved system of unemployment insurance. The Committee on National Expenditure in 1921 suggested the possibility of placing unemployment insurance on the basis of industry. The views of representative associations of employers and employed were thereupon invited on the subject. The replies have been examined by a Committee of the Ministry; and as a result, certain broad suggestions with regard to the principles on which unemployment insurance by industries might be developed have emerged, and are embodied in a memorandum. But the Minister of Labour makes it clear that the suggestions do not by any means represent conclusions that he has reached. Study of the problem shows there are many difficulties to be surmounted, and that various other forms of development require to be explored. However, the circulation of the suggestions among the organizations concerned will probably result in criticism and fresh proposals. That, at any rate, is the hope of the Minister of Labour. The matter is one that will require very careful attention by every industry.

The Suggested Miners' Subsidy.

It was a pretty safe conclusion, before a deputation of the Miners' Federation saw the Prime Minister, that the Government could not consent to differentiate between the miners and other

sections of industrial workers, by subsidizing the wages of the lower paid men. The deputation saw Mr. Bonar Law on Saturday of last week. Of course, the Premier fully recognizes the hardship of many of the workers in the industry; but he sees no way of alleviating it by Government intervention. That was the expected reply. In view of it, the Miners' Federation are now going to consider what shall be their policy in the matter.

A BOARD OF TRADE THERM INQUIRY.

Departmental Committee Appointed.

Sir Philip Lloyd Greame (the new President of the Board of Trade) has responded to the requests which have reached him by appointing a Departmental Committee with instructions to investigate the method of charging for gas on a thermal basis. The following are the members of the Committee:

Sir CLARENDON GOLDING HYDE (Chairman), Vice-Chairman of Messrs. S. Pearson and Son, Ltd., contractors, Deputy-Chairman of the Metropolitan Railway.

Mr. ARTHUR BALFOUR, J.P., Vice-President of the Association of Chambers of Commerce.

Sir JAMES MARTIN, J.P., Accountant, senior partner in the firm of Messrs. Martin, Farlow, and Co., Vice-President of the London Chamber of Commerce.

Mr. A. A. PUGH, Representative of Labour, Secretary of the Iron and Steel Trades Federation.

Mr. W. J. U. WOOLCOCK, C.B.E., General Manager of the Association of British Chemical Manufacturers.

The Secretary is Mr. W. H. L. Patterson, to whom all communications relative to the Committee should be addressed, at the Board of Trade, Great George Street, London, S.W. 1.

PERSONAL.

For the appointment of Engineer and Manager to the Guildford Gas Light and Coke Company, Mr. ERNEST L. NICHOLAS has been selected. He is at present Deputy Gas Engineer and Manager to the Blackburn Corporation.

Mr. CONRAD T. PRICE has been appointed Manager of the Hampton Court Gas Company, under Mr. William E. Price, who was lately elected to the position of Managing Director. Mr. C. T. Price is a son of Mr. Thomas Price, of Walton-on-Thames, and held a Commission in the Norfolk Regiment during the war. He was awarded the Military Cross, and was twice mentioned for conspicuous gallantry in Mesopotamia.

Mr. SAMUEL SPENCER, C.C., Assoc.Inst.C.E., has been elected by the Board Chairman of the Ascot District Gas and Electricity Company, in place of the late Mr. Alfred Kitt; and Mr. W. A. SCOTT, F.C.A., J.P., Vice-Chairman. To fill the vacancy caused by the death of Mr. Kitt, Mr. HENRY KING HILLER was elected a Director. Mr. Spencer, who is well known in the gas industry, has been a shareholder in the Company since its incorporation, and a Director since 1909. Mr. Scott has also been connected with the Company since its incorporation, having been Secretary until 1918, and from that date a Director. Mr. King Hiller was until a few years ago the Chief Engineer of the Shanghai Gas Company.

The Johannesburg Municipal Council have just decided, pending a general scheme of grading, to increase to £60 per month the salary of Mr. HIPWELL, the Gas Superintendent. The Committee reported that Mr. Hipwell joined the Council's service in April, 1902, and was appointed Assistant Gas Superintendent in July, 1909, and Superintendent in January, 1911. The gas output in 1908-9 was 23¼ million c.ft., and the selling prices 15s. and 12s. per 1000 c.ft.; while last year the output was 83½ million c.ft., and the selling price 6s. The progress of the gas department has been remarkable, and a net surplus of from £6181 to £7598 per annum has been made during the last five years. The Committee are satisfied that these results are largely due to the initiative of the Superintendent.

Mr. JOHN GREEN, Superintendent of the Lighting Department of the Birmingham Corporation, retired on Thursday. He had served the city for 45 years. Mr. Green's father retired on superannuation after holding the post for a long period, and was succeeded by his elder son William, who died some years ago. Mr. John Green was then appointed.

Miss HILDA WADDINGTON, daughter of Alderman J. H. Waddington, the Chairman of the Halifax Corporation Gas Committee and well-known at "B.C.G.A." and other gas conferences, has obtained first-class honours in the final examination for the B.Sc. degree in physiology, with chemistry as a subsidiary subject.

In presenting, at a meeting of the American Section of the Society of Chemical Industry, the Grasselli Medal to Mr. W. H. FULWEILER, of Philadelphia, the Chairman (Dr. Harlan S. Miner) pointed out that the medal was awarded for the paper which offered the most useful suggestions in applied chemistry, and in this instance was in recognition of a contribution on "Chemical Problems in the Gas Industry." In 1907 Mr. Fulweiler entered the Department of Tests of the United Gas Improvement Company, becoming Chief Chemist in 1913, and Chemical Engineer to the Company in 1920. As might be expected, Mr. Fulweiler's work in connection with the gas industry has been of a very practical nature, and has had a decided economic application, though he has by no means ignored the purely scientific side of his subject. With an intimate personal knowledge of the industry, both from an American and a European point of view, he constructed one of the first waste-heat boilers on a water-gas set. Then he assisted in the design and erection of the first American type of vertical retort at Manchester, N.H.

On Saturday last an interesting presentation was made in the offices of Messrs. George Orme & Co., Atlas Meter Works, Oldham, to Mr. J. W. LANGDON (cashier), who is leaving this country for Australia, having been in the employ of the Company for over 26 years. Mr. F. A. Collier presided, Mr. R. E. Braddock (Director of Meters, Ltd.), Mr. Manning (Secretary), and Messrs. Stansfield, J. R. Lee, J. S. Lees, V. Travis, and R. W. Jolly, and Miss Dent spoke very highly of Mr. Langdon's sterling worth, and wished him every success in his new sphere. Mr. T. A. Orme, in making the presentation, re-echoed the sentiments of everyone present, and asked Mr. Langdon to accept from the officials of the Company a gold watch suitably inscribed as a token of the high esteem in which he was held by them, also a gold albert with compass pendant as a gift from himself. Mr. Langdon, in reply, thanked them for the beautiful gifts and good wishes, and said that he would cherish happy memories of the time spent in Oldham.

OBITUARY.

Sympathy will be extended to Mr. Walter A. Sapey, Secretary and Manager of the Tamworth Gas Light and Coke Company, upon the death of his elder son, Mr. REGINALD W. G. SAPEY. Death followed an operation for appendicitis performed at an Edgbaston Nursing Home. Mr. Sapey, who was 20 years of age, was a medical student at the University of Birmingham. The funeral on Tuesday was largely attended.

Mr. ALFRED KITT, whose death took place on the 11th ult., had a very old connection with the gas industry. As long ago as 1891, he terminated his association with the Gas Light and Coke Company, after 27 years' service, and was succeeded in the management of the Lupus Street works by Mr. Lacey. Mr. Kitt then took offices in Victoria Street, Westminster, where he started practice as a civil and consulting gas engineer. Subsequently he became closely interested in gas company administration. He was Chairman of the Ascot District Gas and Electricity Company, the City of Ely Gas Company, and the Waltham Abbey and Cheshunt Gas and Coke Company, and a Director of the Mid-Kent Gas Light and Coke Company, and the Yorktown and Blackwater Gas Company. He was for a very long period a member of the Gas Institute and the Institution of Gas Engineers.

Mr. J. A. PURVIS, who has passed away at the age of 73, had completed fifty years' service, for the most part as a collector, with the South Shields Gas Company.

"B.C.G.A." AND SALESMANSHIP.

Midland District Circle Formed.

In connection with the recent activities of the British Commercial Gas Association in forming district conferences, or "circles" as they are to be called, for the actual salesmen of the gas industry, a highly successful meeting of upwards of fifty representatives of Midland gas undertakings took place last Wednesday afternoon, at the Chamber of Commerce, Birmingham. Mr. R. J. Rogers (Birmingham) having been voted to the chair, Mr. W. M. Mason (the Manager of the British Commercial Gas Association) explained the situation at some length, and pointed out that conferences or circles which had already been formed in some districts, and which it was now proposed to organize in the Midlands, would be of material assistance to the salesman.

A number of speakers warmly supported the suggestion, and it was then unanimously resolved to form a circle with the title of the British Commercial Gas Salesman's Circle (Midland District). Mr. R. J. Rogers was elected first President, and Mr. Frank R. Ayre, Birmingham, Secretary. The question of arrangement of meetings was left to a Committee representative of the following undertakings: Birmingham, Burton, Cheltenham, Coventry, Derby, Gloucester, Leicester, Nottingham, Redditch, Smethwick, Stafford, Stoke, Stourport, and Wolverhampton. The drawing-up of a programme was also left to the Committee.

Mr. Mason was heartily thanked for his helpful advice and assistance, and Mr. Rogers for taking the chair.

A fuller report of the proceedings will appear in the next issue of the "Gas Salesman."

Illuminating Engineering Society.—At a meeting at the Royal Society of Arts next Tuesday evening, Dec. 12, Mr. Haydn T. Harrison will open a discussion on "Recent Developments and Modern Requirements in Street Lighting."

THE ADMINISTRATION AND FINANCE OF GAS UNDERTAKINGS.*

Reviewed by H. E. IBBS.

THE author of the above work, Mr. George Evetts, Assoc.M. Inst.C.E., has produced a very useful book on the administrative side of gas undertakings. The engineer is well provided with technical handbooks, but the manager, the secretary, and all who have to deal with the many and varied problems that confront them on the financial side of the business, are badly catered for; and therefore a work of this description should find a good welcome awaiting it. Administrative questions are dealt with in a very lucid manner, devoid on the one hand of a complexity of technical language, and on the other hand of elementary matter that is often wearisome and of no particular value except to the complete novice.

Mr. Evetts provides for the needs of the junior assistant, and for those whose ambition it is to reach a higher administrative position; and he has not only accomplished his purpose with marked success, but produced a volume the interest and use of which will be apparent to all engaged in the industry.

The Gas Regulation Act, 1920, forms the sub-title of the book; and the importance of this measure naturally justifies the prominence given to it. The whole of the Act comes under review; and those who contemplate applying to the Board of Trade for an order for any purpose will find the information they are likely to require given in precise detail. Legislation specially applicable to the gas industry, and the procedure to be adopted when applying to Parliament for a private Act, are fully dealt with.

The subject that probably needs more careful consideration by gas officials than almost any other financial matter, is the cost of making and distributing gas upon a thermal basis, and the author has paid special attention to its importance by dealing with nearly every aspect. The arithmetical examples will be found of great assistance, and will help in obtaining a clear understanding of this most important problem.

Other matters dealt with are the hiring-out and fittings side of the business, arbitrations, amalgamations, income-tax, and rating.

If there is any criticism at all of such an excellent addition to our literature, it is in regard to the treatment meted out to such important subjects as income-tax and rating. These could have borne a more exhaustive survey; but perhaps Mr. Evetts will at some later stage give us the advantage of his knowledge and experience in the shape of a further treatise. Although I agree with him that "the rating of gas-works is a matter for the expert," it is none the less essential that officials should be fully acquainted with the subject, as their presence before Assessment Committees is in many cases desirable even though a Rating Surveyor be employed. A complete knowledge of assessment work in all its bearings is admittedly very difficult to acquire from any book, no matter what practical experience the author may have had, or how greatly he may be endowed with the gift of lucid expression. The same may be said of the difficulties surrounding income-tax matters. Practice and procedure, mainly the outcome of case-law, surround and render the Acts dealing with the subjects of rating and income-tax of almost secondary importance.

At the end of the book Mr. Evetts refers to the Gas Companies' Protection Association as having been responsible for the introduction of the scheme accepted by the Inland Revenue authorities for fixing by way of renewals or depreciation the various allowances to be given to gas undertakings. This was not the case; and I am sure the Association would be the first to point it out. A Committee was formed at a meeting held at Horseferry Road and presided over by the late Sir Corbet Woodall, and included such well-known names as Mr. W. Cash (who acted as Chairman), Mr. E. L. Burton, the late Mr. E. W. Drew, Mr. A. A. Johnston, Mr. A. Bevis, and others; the honour of being Secretary to the Committee falling upon the writer of this article. Much good work has, however, been accomplished by the Gas Companies' Protection Association in obtaining special allowances from the Inland Revenue authorities since the scheme was applied to the industry.

In conclusion, it is hoped that Mr. Evetts' book will find a place in the technical library of every undertaking in the kingdom, from the largest to the smallest; and those who refer to it (as they must repeatedly feel the necessity of so doing) will have the information sought for presented to them in a clear and concise manner.

* The Administration and Finance of Gas Undertakings, by George Evetts, Consulting Engineer. London: Benn Bros., Ltd., 32s. 6d. net.

London and Southern District Junior Gas Association.—This (Wednesday) afternoon members are visiting the Holloway Road works of the James Keith and Blackman Company, Ltd. At the monthly business meeting, on Friday evening, Dec. 15, at the Westminster Technical Institute, three subjects will be discussed. "Fuel Economy on Gas-Works Boilers" will be introduced by Mr. T. W. Andrews, of the South Metropolitan Gas Company; "Coal Testing," by Mr. William Bell, of Reading; and "Heat Insulating Materials," by Mr. W. Newton Booth, of Woolwich Arsenal.

CITY AND GUILDS OF LONDON INSTITUTE.

Report on the Session 1921-22.

DURING the session 1921-22 only very slight change was made in the scheme of technological examinations held under the auspices of the Department of Technology of the City and Guilds of London Institute, particulars of which are to be found in the report on the work of the department for the session, which has just been published by John Murray, of Albemarle Street, London, W., at the price of 1s. net.

One of the alterations was that, with the consent of the Board of Education, Grade II. of Gas Fitting was added to the list in England and Wales; and there were 79 entries for this examination. There was an increase in the total number of candidates examined in technical subjects within the United Kingdom from 7959 in 1921 to 9133 in 1922. Satisfaction is expressed at the fact that the entries for Grade I. of Gas Engineering and of Gas Supply in England and Wales were well maintained. On the other hand, there is regret that there were not a sufficient number of entries to warrant an examination in Heating and Ventilating Engineering. An important meeting, it is stated, in connection with examinations in Gas Fitting, at which there were present the Secretary of the Institution of Gas Engineers, Mr. R. J. Rogers (the Institute's Chief Examiner in the subject), and twelve gentlemen who had acted as Local Examiners at the practical tests, was held at the offices of the department on Aug. 11 last. It was thereat recommended that next year the Local Examiner should have the opportunity of inspecting work done in the district by each final candidate, and that the *viva voce* examination should be held separately on the morning of the day on which the practical tests were to be worked. Upon the request of the Institution of Gas Engineers, and with the consent of the Board of Education, examinations in Grade I. of Gas Engineering and Gas Supply and in Grade II. of Gas Fitting will again be held in England and Wales in 1923.

Some hints are given which it would well pay those intending to sit for the examinations to note carefully. The reports received from examiners, it seems, again show that only too often the questions are not read-over carefully by the candidate before he begins his answers to them. Extraneous matters are then introduced, and sometimes he has throughout had in his mind an entirely different question. Valuable time is thus lost, and no additional marks are gained. More practice in answering questions in writing would in many of the lesser subjects be advisable; and the report therefore brings this recommendation once more to the attention of teachers and candidates. It is pointed out that the habit of studying carefully the wording of questions asked, in order to determine their exact meaning, is not merely a necessary preliminary to success in examination, but is also valuable in the daily work of those who aspire to rise in their profession. The examiners in some subjects have also again called attention to the poor general education of candidates, as shown by the bad English and bad spelling of their written answers.

There are tables in the report which give the general results of the examinations, with details of passes and failures; and these show the percentages of failures to have been as follows: Coke and Bye-Products Manufacture, 23·7; Coal-Tar Distillation, 29·1; Dyes and Colouring Matters, 28·1; Gas Engineering, 36·9; Gas Supply, 32·7; Gas Fitting, Grade II., 49·3; Gas Fitting, Final, 45·8. The number of candidates presenting themselves was: Coke and Bye-Products Manufacture, 38; Coal-Tar Distillation, 24; Dyes and Colouring Matters, 32; Gas Engineering, 227; Gas Supply, 217; Gas Fitting, Grade II., 72; Gas Fitting, Final, 48.

Tar Separation in Water-Gas Plants.

In a communication obtained by the Committee on Disposal of Waste from Gas Plants, on behalf of the American Gas Institute, Messrs. T. S. Barlow and J. S. Kennedy state that a study has lately been made of the conditions of tar separation in water-gas plants in New York, with the object of segregating the tar into fractions of differing specific gravities. For a preliminary experiment, at one large plant, the condensates were collected at numerous points and treated separately. That is to say, individual separators were provided for handling the condensates from the wash-boxes, the condensers, and all other apparatus. The proportions of tar recovered were: Wash-boxes, 30 p.ct. (1·10 sp. gr.); condensers, 50 p.ct. (1·07 sp. gr.); other apparatus, 20 p.ct. (1·04 sp. gr.). The large proportion recovered from the condensers was probably due to tar from the wash-boxes being carried over into the collecting mains. From the work done, it was found that this system of divided separation presented no serious difficulties of operation; and as the result of the experiment, other plants have adopted it. One advantage is a reduction of the tendency to form tar-water emulsions. The waste water discharged from all separators passes through a coke filter. The water is passed upwards through the coke in the first compartment, overflowing through a weir into the second compartment, thence downwards through the coke in this compartment to the bottom of the discharge pocket, from the upper surface of which it flows to waste. It is desirable that a final settling tank should precede the coke filter. The authors point to various favourable features of the system, and remark that obviously materials of different gravities require selective treatment, and this treatment can only be applied by selective separation.

W-D

An Appeal to Gas Undertakings.

¶¶ GAS UNDERTAKINGS COMPLAIN that owing to Trade Depression their Sales of Gas, Residuals and Coke are bad.

¶¶ GAS UNDERTAKINGS should consider their Manufacturing Costs carefully and decide how they can, by reconstruction, improve their financial position.

¶¶ Gas Undertakings may not require extensions now, but the greater number of works have INEFFICIENT or OLD PLANT which requires replacement.

¶¶ The LACK OF HOLDER CAPACITY often prevents good Working Results being obtained.

¶¶ EVERY ORDER GIVEN for work to be done TO-DAY MEANS AN IMPROVEMENT IN TRADE which is immediately reflected in greater demands for Gas.

¶¶ TO-DAY BUYERS ARE ABLE TO SECURE EXCEPTIONALLY GOOD PRICES, Manufacturers having to keep their Works and Staff employed.

¶¶ COMPETITION IS KEEN. Contractors can give better attention and quicker delivery than when Trade is Brisk.

¶¶ NOW IS THE TIME TO BUY, not when everyone wants Plant.

¶¶ By placing Orders for Gas Plant and Apparatus to-day, GAS UNDERTAKINGS will immediately benefit themselves and

Help the Trade of the Country.

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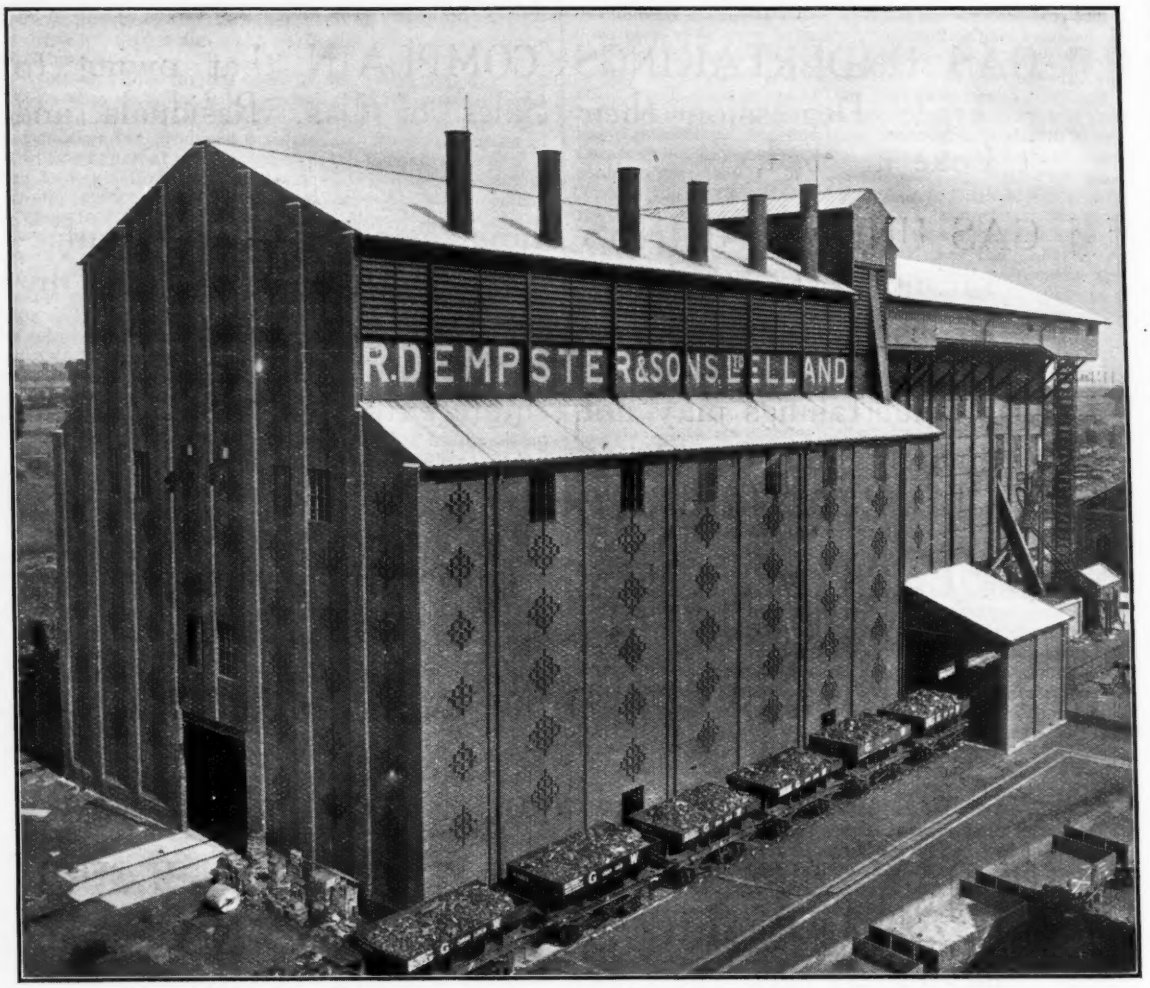

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ELECTRICITY SUPPLY MEMORANDA.

THERE seem to be different views in the electricity supply industry regarding the causes that prevent a big wave of adoption of electric cookers over the whole country. Some say it is due to high tariffs, others to the non-application of hiring and hire-purchase systems, and others again to the absence of standardization of the cookers, which should lead to mass production, and so bring down the first cost. Probably all three reasons have part; and there are additional ones which have often had mention. Electrical men know that there is an accumulation of causes, and that an important one is not inherent to electric cooking. It is the fact that there is another labour-saving agent which from the purchase of appliances and installation, throughout use, is more economical than electricity, and can render a larger range of duty with greater efficiency. If half the work that is done on a gas-cooker in (say) a middle-class or artizan household was performed on an electric cooker, ruination would stare in the face the occupants of the house. However, it appears from a statement in the "Electrical Review" that the Incorporated Municipal Electrical Association are calling conferences throughout the country to stimulate the use of electrical apparatus; and it is thought this action will lead to useful results. In the stimulating process, the standardization of cooking and other domestic appliances is regarded as the main factor. But at one of the conferences at the Institution of Electrical Engineers, the "Review" says the feeling appeared rife that rigid standardization was hardly a practical proposition—anyway at the moment. This is not surprising, as minds in the industry are in a perfect state of chaos as to what are the most suitable details in the design of cookers, and the manufacturers naturally think their own designs are the best, and are "unwilling to commit themselves to finality." There are valid arguments both ways. Standardization should, of course, result in cheaper production; but at the same time it does eliminate the selling points which are found in the differences between one make and another, and it does—partially at any rate—put the brake on individual effort to effect improvement in working efficiency. If standardization cannot be introduced in practice at the moment, our contemporary thinks the main lines of designs might be agreed. One important point in standardization is that it enables interchangeability; and this is an economy in maintenance and in stocking parts. Our contemporary is convinced that until certain broad types are generally approved throughout the industry, electric cooking will never go forward by leaps and bounds. Electric cooking has been trying to make headway for forty years; and to attempt to imagine it going forward now, with all its impediments, by "leaps and bounds" is something that is richly amusing. The impediments are of a somewhat weighty nature; and a grave one is the competition of greater economy, of which neither standardization nor anything else can relieve electrical operation. Our contemporary speaks truly when it says: "As everyone knows, a vast amount of money has been spent in experimenting with electric cooking, a good proportion of which has led up blind alleys." There is a wealth of meaning in those words.

Electric Cooker Standardization.

According to a notice in the "Electrical Times," the Jackson electric cookers have had what is electrically regarded as a good adoption by the standardization of three sizes, whereby it is claimed that the maintenance costs are low. This has led to their popularity—as electrically measured. No doubt the best instances are quoted; and they do not stagger us. There is the Marylebone district, in which it is said that some 500 Jackson cookers are on hire; Newcastle boasts of approximately the same number; and on a housing estate at Woolwich, nearly 400 have been fixed. The three cookers have been standardized throughout. The spirals on the boiling-plates are interchangeable, as are also the spirals in Nos. 20 and 21 ovens together with the grill elements. The clay formers on which the elements are mounted are constructed of special material, to which is attributed long life in use. Since all the connections are of solid rod or strip, insulated on porcelain, and high quality switches only are employed, renewals practically amount to nothing more than the occasional replacing of the wire spirals. That is how the report goes. The cookers are mounted on legs, which is the approved fashion nowadays—even for gas-cookers! The prices of some of the firm's electric cookers have been reduced by about 12 p.ct., despite improvements in design and constitution. What the actual prices are, receives no mention in the notice before us. There is quite an economy of publicity in connection with the prices of electrical appliances.

Value of Standardization.

In last week's "Memoranda," reference was made to the first part of an article, on "The Homecoming of Electricity," contributed to the Jubilee number of the "Electrical Review" by Mr. J. W. Beauchamp, the Director of the Electrical Development Association. The concluding part of the article has now been published; and in its principal part it deals with that vexed subject, the making of tariffs. There has over long years past been a great deal of time, more or less intelligence, and much eccentricity expended on the devising of tariffs for electricity; and this has shown what a difficult business it is. The very fact demonstrates that the good old plan of plain and easily understandable flat rates would not apply comfortably to electricity supply for different purposes; and that Mr. Beauchamp is still discussing the matter, and looking forward to the movement in favour of the adoption of a multi-part system resulting in universal application, indicates that a generally acceptable tariff goal has not yet been reached. However, the movement has been helped very largely by the experience in connection with power supply. The methods of charging for industrial supplies have crystallized round the maximum demand system—collecting a fixed charge per annum in relation to demand, and a further charge, generally in association with sliding-scales on coal and other variables, for the kilowatt-hours used. The electricity industry is now, as Mr. Beauchamp observes, in process of adapting these methods to domestic supply; and already half-a-dozen "simple and attractive" tariffs are struggling for supremacy. One could make merry over some of the bases for these "simple and attractive" tariffs. Rateable value and floor area are in connection with them two of the bases for the primary charge; and they have no more association with the factors going to make up the cost of electricity supply than (as one facetious individual some time since put it) the area of one's coat buttons. Mr. Beauchamp admits that the rateable value of premises frequently varies rather widely from the electrical needs; and, in our opinion, it would be much more rational to adopt an assessment system, with the fixed charge based on capacity connected. So the growing tendency appears to be to insist on an annual fixed charge, and to associate this with the lighting requirements; and, in addition, to handle all the cooking, heating, and other applications by means of one, or perhaps two, running rates per kilowatt-hour. Electrical engineers, it seems, are being confirmed, by growing experience of the very high diversity of other uses of electricity in the home, in the principle of fixing the subscription charge on the lighting requirements.

Mr. Beauchamp on Tariff Making.

That gas was not always supplied by meters, but in ancient days on a contract system, appears to afford some comfort to Mr. Beauchamp. We cannot see any relation in the practice that obtained before gas-meters were invented to what is being done in the electricity supply industry now, other than in respect of fixed charges for electric lamps. The author says "it is interesting to remember that, when gas was first supplied in a public way, it was sold on the contract system for lighting at some small rate per burner per year." But what he does not record is that never in the whole history of gas supply—not even during the "therm stunt"—was there more trouble over gas charges than during those times, when men had to go round and "spy out the land" to ascertain that the consumers were conscientiously carrying out their part of the bargain. Many were the discoveries of transgressors; many, too, were the undertakings that found their revenue barely covered their outgoings, though there should have been a reasonable balance to the good. There is a little envy of the gas people, who have found their tariff problem simpler, because of the ability to store gas, to make it at a steady rate, and yet, if required, at a fluctuating rate to suit users' needs. But Mr. Beauchamp appears to entertain some doubt as to whether gas undertakings will always continue in this happy position. We read that "already it is stated that in some large cities the gas-cookery peak is so heavy on Sundays as to need the firing-up of a few extra retorts; and the consumption fluctuations are beginning to outstrip the capacity of the gasholders." In large cities, the gas undertakings have a simpler process of meeting flights in demand than that of firing-up a few extra retorts; and as to outstripping the capacity of the holders, the builders of those vessels will, after Mr. Beauchamp's article, anticipate an almost immediate large revival of business, which has been somewhat slack during the period of high prices for material and labour. The fact of the matter is that, if the holders are equal to the 50 p.ct. or so of gas that goes out during the hours of darkness before nocturnal rest, those holders—combined with the facts that coal-gas making is a continuous process, and that water-gas plants help gas to leap comfortably over the peaks—are equal to the fluctuating demands of the daytime. It seems that for multi-part tariffs the electricity industry finds precedent in the natural gas industry, in which the cost of the gas is small in comparison with the expenditure on storage and distribution. Mr. Beauchamp says that the natural gas has been sold, particularly in large quantities, for operating central heating boilers on a multi-part tariff—an initial charge being made in accordance with the maximum rate of use (in some cases also a service charge), and then the gas is sold at a rate based on cubic feet. The author has no doubt regarding the fairness of these charges; but he advocates in connection with them a little looseness. He says: "The only problem before us is to make them sufficiently simple in practice, and to base our calculations rather upon averages than upon individuals, to regard a street of houses as a group, and to look to the maximum demand on feeding points rather than on individual terminals." There, it seems to us, Mr. Beauchamp, by the application of averages, would penalize the economical man and give a premium to extravagance. We doubt the fairness of the method.

The Superior Position of Gas.

Advice. Proceeding, we find Mr. Beauchamp is opposed to giving an unrestricted supply for a fixed charge. This, he says, is likely to prove a disastrous policy, and to be inequitable as between one user and another. A multiplication of meters is not wanted; but apparently, for a long time to come, tariffs must centre round the use of at least one unit-recording meter. He adds:

> If we are able in this way, particularly as electricity areas extend and linking-up is carried out, to operate a single and uniform flat rate for the kilowatt-hour over large areas, and to secure adequate payment for differences in distance and density of demand by means of varying fixed charges, we shall be well on the way to a tariff which will be safe for the undertaking and satisfactory to the user.

This looks like a forecast of what Mr. Beauchamp thinks may come along. He is against reducing lighting rates, but prefers a low and competitive rate for heating and cooking. This persistent lumping of everything on to the lighting consumer is not equitable; but it shows the recognition of the parts of the electrical business where the greatest weakness resides. There is further admission of this in the statement: "We have as data our known costs of supply, and the fairly well-known costs which would be achieved if the supply were to develop in this or that direction. These act as a general guide in tariff-making; but the real indication comes to us from the rates charged for competitive media, fuel and gas. In short, we must give more and more attention to the value of the service rendered, keeping lighting charges fairly well up, and depressing heating and power charges; and with regard to power, it is well to bear in mind that the value of electric power to the user depends upon what he does with it, and the relative position which his power bill occupies in his total cost of production." These are really confessions as to where the boot pinches the hardest. Mr. Beauchamp, in his ardent desire to get the multi-part tariff adopted, would apply the coercion of high maximum flat rates to consumers who prefer them. He believes that the next two or three years will see a much wider use of the multi-part tariff—"particularly if its advantages to the consumer can be supported by relatively high maximum flat rates. . . . By keeping up the statutory maximum flat rates, there will be a great growth in the use of the multi-part tariff." What of those people who dislike paying the lump sum down for the initial charge? Does Mr. Beauchamp want to force them to withdraw their custom, by overcharging them on the flat rate?

Ten Years Hence. We have read a great deal of electrical nonsense in our time; never anything more fatuous than an article that appeared in the "Daily Sketch" on Tuesday last week. The writer is looking forward, and peeping into the kitchen of ten years hence. By that time, he predicts "arm-chair housework *for all;*" in other words, that the housewife will, by the aid of electricity, be turned into an indolent, lazy person. Of course, she will be nothing of the kind. British housewives, or those who are worthy of the name, are not built that way; and, as a matter of fact, few will be the households that will be able to afford the apparatus that is supposed to be going to bring about that condition of things. Just listen to how the piffle starts: "In a room bright with the sunshine of primrose yellow walls, sits a woman at work—a spotless, glittering apartment, where lingers neither dust nor dirt. The floor is of polished boards, with here and there a coloured rug; the distempered walls are cool-looking and clean, and high in the ceiling spins a silent electric-fan." The "work" referred to is all to be performed by pressing a button or pulling a lever. The electric cooking range is the only thing that will betray that this is a kitchen. While electricity is doing the work, the mistress will sit at a sewing-machine which electricity operates. The dainty fingers will never be soiled; the heart will never be wearied. Bedrooms will be warmed by electric stoves; shaving water heated from the same source. From the dining-room to the kitchen, the dirty dishes and plates will pass by an electrically operated endless belt. They will be delivered to the electric plate washer, supplied with water from an electrically heated water-boiler. Alongside the plate washer will be the electric washing-machine. The house will be cleaned by a vacuum cleaner. A buffing machine will polish silver and brass. Cakes will be kneaded, eggs whisked, and boots polished—electrically. The electric kettle and the electric toaster will help in the arrangements for tea. It is well that the writer put the period at ten years before these fantastic notions are supposed to come into being in every household. By that time people will probably have forgotten the hare-brained prediction. But possibly there exist people who believe even in fiction of this kind; but they must be of the few, and not of the many. At any rate, we hope that sanity is not on the wane in this country, but sorrow to see that electricity is so hard put to it that, to attract attention, it has to call to its aid such foolishness as is presented to the public in the "Daily Sketch" article.

Cost of a Housing Lighting Scheme. What is considered to be a "satisfactory figure" for lighting in connection with a housing scheme, is to hand in the report of Mr. J. E. Tapper, the Electrical Engineer of the Beckenham District Council. The number of houses fitted-up was 196; and the number of lamps was equal to 1290 of 32-watt capacity. The cost of the work was £3587, or £18 6s. per house. This included high and low tension mains, services, connecting boxes, internal wiring, fittings, and lamps. And this expense for the comparatively small amount of revenue that will be obtained per house for lighting! If we put interest, sinking fund, and maintenance charges at only 15 p.ct. per annum, the figure will be £538; if at 20 p.ct., £717. It does not look as though these houses will produce much "profit."

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

Visit to the Helensburgh Gas-Works.

On Saturday afternoon, Nov. 25, a representative company of the members of the Western District of the Scottish Junior Gas Association visited Helensburgh, where they were privileged to inspect the gas-works. Mr. David Fulton, the Manager at Helensburgh, and (by the way) a former Secretary of the Juniors, met the visitors and, in company with members of the Town Council, explained the features of interest in the undertaking. The following notes on the works at Helensburgh will be found instructive by those who took part in the visit, and by those who, for other reasons, found it inconvenient to attend.

The Helensburgh gas undertaking was founded by the Helensburgh Gas Company in the year 1844, and was carried on by them until purchased by the Town Council in 1899. Part of the works remains on the original site, which has had to be added to from time to time. They have been almost entirely reconstructed since coming into the hands of the Corporation; and only the condensers and a tower scrubber now remain of the old Company's plant. The works are situated opposite Helensburgh passenger station, and there is a branch line across the main street into the works which enables the coal to be brought in direct. The wagons are shunted by means of a steam capstan situated in the coal-store.

The main feature of interest is the Glover-West vertical retort installation, which was the first erected in Scotland for the manufacture of all the gas required by a community. The plant, which was started to work early in July, 1911, consists of 16 retorts in units of two retorts, and is provided with the usual coal breaking and elevating plant, the latter being of the gravity-bucket type. Power for the extractors is obtained from 4½ H.P. National gas-engines, in duplicate; and these are situated in the power-house along with a 24 H.P. National gas-engine for driving the breaker and elevator. The overhead storage hoppers are smaller than those now usually erected, and contain only a 24 hours' supply of coal. The original capacity of the plant was 500,000 c.ft.; but with modern steaming methods, it is estimated that at full output the plant will produce nearly 750,000 c.ft. per day. The plant has given great satisfaction; and ten of the original retorts are at work at present. The other six retorts were rebuilt in 1920. The cost of repairs and renewals has, therefore, been very small. The condensers are of the atmospheric type; and as they are situated in the opposite end of the works from the retort-house, there is a long run of foul gas main, carried overhead on trestles, which materially assists condensation.

The exhauster is a Waller three-blade machine; and a new and larger Waller four-blade machine is at present in course of erection. The ammonia washing plant consists of a tower scrubber filled with boards and brushwood, a Livesey washer, one million c.ft. per day capacity, and a Holmes brush scrubber.

The purifiers are of the water-lute type, four boxes 24 ft. by 20 ft.; natural bog ore being used, and revivification *in situ* carried out on the backward rotation method.

The station meter is by Messrs. James Milne & Son, Ltd., and has a capacity of 25,000 c.ft. per hour.

The storage capacity is 400,000 c.ft. in two holders, of 200,000 c.ft. each—one standard guided by Messrs. Newton, Chambers, and one spiral guided by Messrs. R. & J. Dempster. The highest delivery of gas in one day last winter amounted to 528,000 c.ft.

The pressure to the town is controlled by a 15 in. Foulis governor; and a 9 in. governor of the same type controls the pressure on the outlying villages of Row and Shandon.

The steam required is raised in a Lancashire boiler, 30 ft. by 8 ft., working pressure 120 lbs.; and there is a stand-by Cornish boiler 20 ft. by 6 ft. 6 in., 80 lbs. per sq. in.

A roomy fitters' workshop is situated in the upper story of the boiler-house.

The coal-store, which was erected in 1911 and fronts the main street, is built of terra-cotta bricks, and gives the works a very clean and tidy appearance.

The quantity of gas manufactured last year was 112 million c.ft.; and the present price is 3s. 4d. per 1000 c.ft. When the works were taken over by the Corporation, the quantity made was only about 40 million c.ft., so that under the Council very considerable progress has been made.

Midland Junior Gas Association.—The meeting which had been arranged for last Thursday, Nov. 30, had unavoidably to be postponed. The paper by Dr. H. Hartley (Chief Chemist to Radiation, Ltd.), on "Developments in Gas Appliances," will, however, be presented early in the new year.

THE "ELECTRO" FLOW METER.

By JOHN TERRACE, of the South Suburban Gas Company.

[A paper presented at the Annual Meeting of the Southern Association of Gas Engineers and Managers, Nov. 23, 1922.]

On account of its accuracy, reliability, and simplicity, the present drum-type of station meter will doubtless continue to be universally used for recording the quantity of gas made in gas-works; but nevertheless there are many purposes on a works for which a cheaper and less bulky form of meter is desired, provided it can be relied upon to register with a reasonable degree of accuracy. It is the purpose of this paper to give a short description of such a meter, and to place before you the results of tests made, in the hope that they may prove interesting and helpful.

Last year the meter for measuring the water gas at one of the South Suburban Gas Company's works broke down—and small wonder, as it was being called upon to pass over 50 p.ct. above its capacity. This, of course, was a very undesirable thing to do, especially if correct registration was required; but as the mixed coal gas and water gas were measured together at a later stage in a station meter which accurately measured the total gas made, the inaccuracy of the registration had no serious consequences. The limited space available, and the difficulty with gas connections, made the fixing of a larger size almost impossible; and as it is expected in the near future to close-down the works in question, it seemed undesirable to incur a heavy expenditure if it could be avoided. About this time a flow meter using electricity as the medium for registration was brought to the writer's notice; and as it offered great promise of giving a reliable record of the gas passed through it, and the cost was very reasonable, it was decided to test it in series with the present station meter, and, if it proved satisfactory, to fix it in place of the water-gas meter already mentioned as being too small. Moreover, the writer had in mind many other positions, which no doubt immediately suggest themselves to your minds also, where such a type of meter could be used advantageously on the crude gas; and as the size of the meter and the cost are the same for any capacity, the experiment promised to be of considerable interest.

Fig. 1 shows the back of the station meter, of 30,000 c.ft. per hour capacity. At the left-hand bottom corner is the meter body of the "Electro" meter, and in the distance the panel carrying the measuring instruments.

Fig. 2 indicates the principle of the meter diagrammatically. An orifice plate of Monel metal is inserted in the gas-main, and the pressure in the pipe on one side of the orifice plate is made to balance the pressure on the other side by raising the mercury in the container marked U. The mercury column forms part of an electric circuit which contains a fixed external resistance R_1 in series with a variable internal resistance R_2, a constant electromotive force E, an ammeter A, and a watt-hour meter W. In the contact chamber C, which forms the low-pressure side of the U-tube, there are a number of conductors of varying lengths placed above the mercury column, and as the mercury rises it makes contact with one conductor after another. The variable resistance R_2 is sub-divided by these conductors into resistance

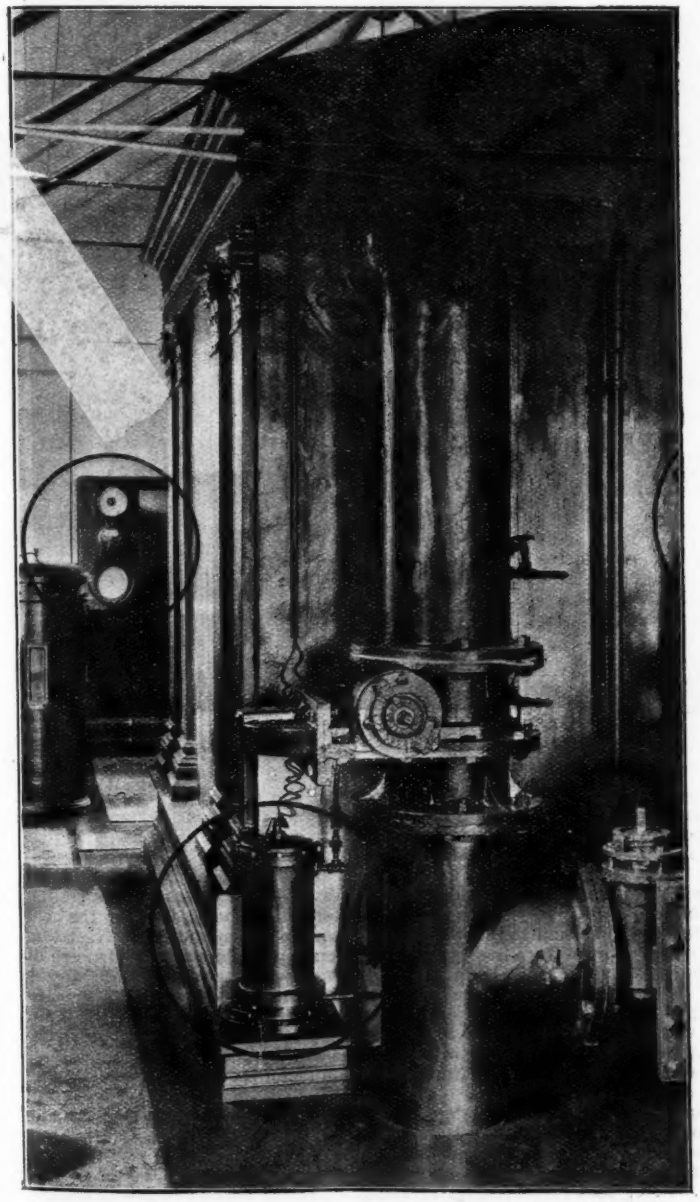


Fig. 1.

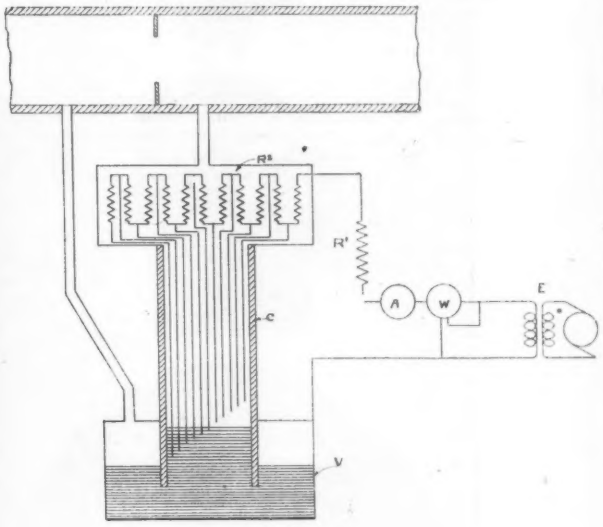


Fig. 2.

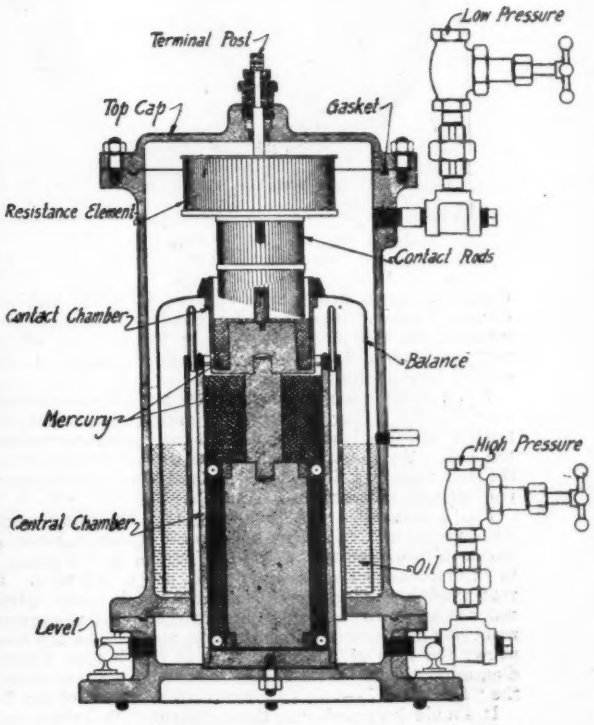


Fig. 3.

steps, so that the rise and fall of the mercury column varies the amount of resistance, and therefore regulates the amount of current passing through the circuit. Moreover, the resistances are so divided that the flow of the current in the circuit is directly proportional to the flow of gas in the pipe, so that the electrical instruments, while measuring the current regulated by the flow, actually register the amount of gas passing through the pipe. The total amount of electrical energy measured by the wattmeter is the exact equivalent of the total amount of gas passing through the pipe. Great accuracy is ensured by using highly-sensitive electrical instruments; and by employing electric current to transmit the action to the reading instruments, all uncertain mechanical appliances—such as floats, cams, levers, gears, and stuffing boxes—are avoided.

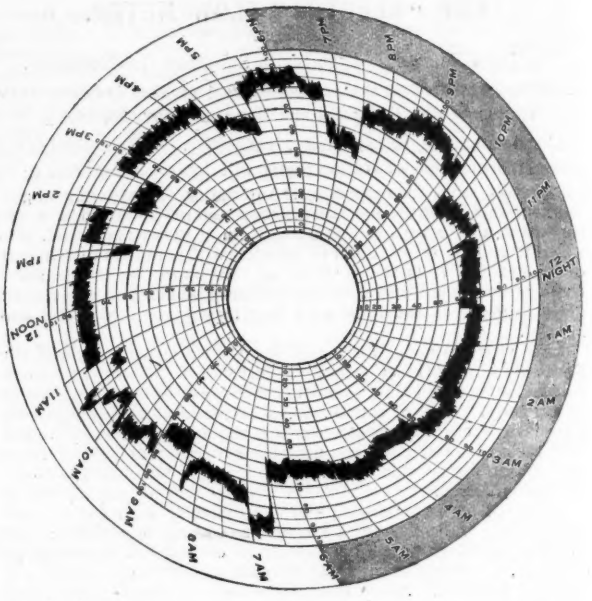


Fig. 5.

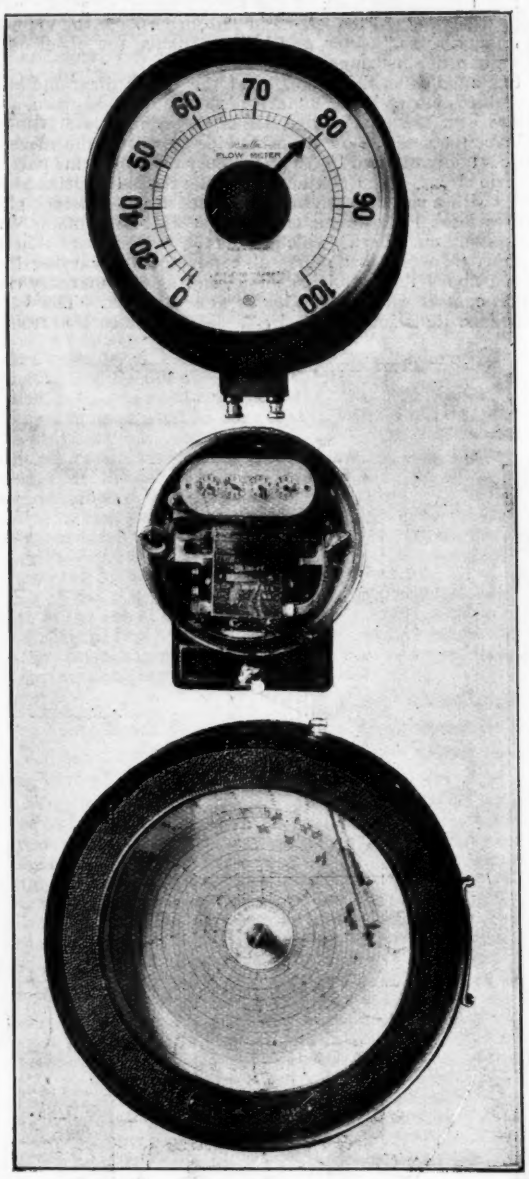


Fig. 4.

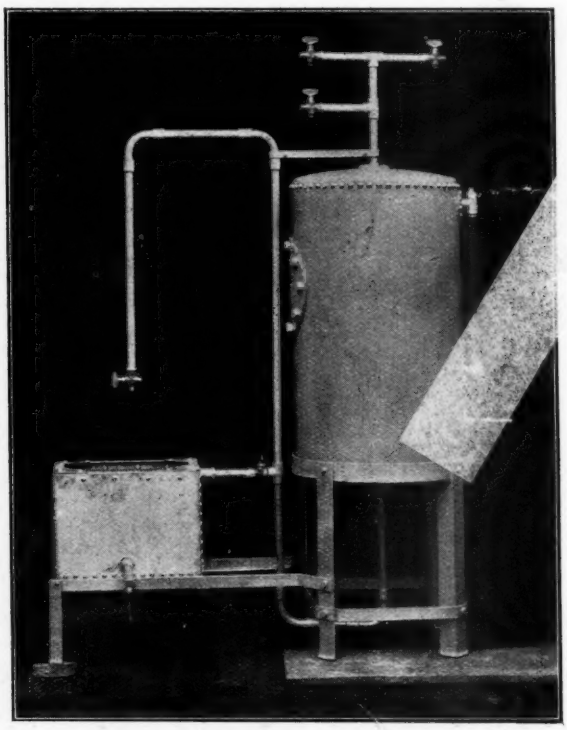


Fig. 6.

Fig. 3 shows a section of the meter body, from which it will be seen how the higher gas pressure acting on the underside of the floating bell is balanced against the lower pressure on the top of the bell. As the differential pressure increases and decreases the bell rises or falls, and varies the electrical resistance by the contact rods in the contact chamber.

Fig. 4 illustrates the indicating and recording instruments. The current used is alternating current at a pressure of 40 volts; and a voltage regulator is used to ensure its constancy, though in future meters this is likely to be dispensed with. The current available being direct current, a small motor-driven alternator is used, which delivers at 140 volts—a transformer in the recording instruments reducing to 40 volts. The top instrument shows the rate of flow, and that at the bottom indicates this diagrammatically. The centre instrument—a wattmeter, called the "Integrator"—totals accurately the amount of the flow.

It should be noted that these instruments do not indicate in cubic feet. If the quantity of gas passing could be kept within the range of the indicator, and the specific gravity were constant, this could be arranged; but as the hourly quantity to be measured in winter so greatly exceeds that in summer, and it is undesirable to alter the size of the orifice plate, it is more convenient to multiply the readings by a factor which is varied according to (*a*) the specific gravity—a very necessary operation when varying quantities of water gas are being added to the coal gas, and the meter is being used on the mixture, as a variation from 0·450 to 0·550 in specific gravity would make a difference of approximately 9·5 p.ct. on the meter reading; and (*b*) the weight being used on the bell—usually one for summer make and one for winter—and the temperature and barometric pressure. In practice this is found to be quite simple; the correction factor being arrived at daily with but little more trouble than is entailed in ascertaining the usual correction factor for temperature and barometric pressure.

Nevertheless, the fact that the meter does not read directly in cubic feet is a certain drawback, as the man responsible for the carbonizing results does not have his hourly make registered as with the ordinary type of station meter. Against this, however, may be placed the advantage of having the rate of flow of the gas indicated as shown in fig. 5. The large variation in the make of gas on this diagram is caused by the addition of water gas in

varying quantities; and it is satisfactory to know that the meter is capable of registering with reasonable accuracy under these trying conditions.

OBTAINING SAMPLES OF GAS.

A simple apparatus installed before the advent of the flow meter is used for obtaining a representative sample of the gas made during the 24 hours, from which the specific gravity is obtained; and it is found that the use of this figure in arriving at the factor to be used for converting the readings of the watt-meter into cubic feet gives satisfactory results. This sampling apparatus has already been described in the Technical Press; but I understand it can now be purchased complete and ready for use, which is a great convenience. Its utility in obtaining a representative sample of gas for other purposes suggests that an illustration and short description of it may with advantage be given here.

Fig. 6 is a photo of the apparatus. It consists essentially of a receiver of about 5 c.ft. capacity (which quantity is sufficient for a calorimeter test, a sample for analysis, and a specific gravity determination), and a simple arrangement to ensure the gas being drawn into the receiver at a constant rate. The receiver is first filled with water, and as the water runs out the gas is drawn in, which is a common method; but without the intervention of suitable additions, the rate at which the gas would be drawn in would vary according to the level of the water. This is obviated in a very simple manner, the water being passed through a U-tube, which acts as a seal to prevent the gas from escaping when the receiver is full, to a cock which is controlled by a float in the small tank. The water is run off from this tank through a regulated cock, the head of water on which is kept constant by means of the ball valve. Suitable arrangements for overflow, sampling, and testing pipes are provided; and the apparatus does its work satisfactorily, with a minimum of attention.

WORKING TESTS OF THE METER.

The voltage regulator ordered with the meter was unfortunately delayed in transit; but rather than postpone the test, the meter was put to work without it; and the daily record showed that the difference in registration between the station meter and the flow meter over a period of two months was 0·81 p.ct. It is satisfactory to note that, with the great fluctuations in daily make, the difference is very slight. Corresponding particulars after the fixing of the voltage regulator showed a difference over a period of 36 days of 0·3 p.ct. The quantity of electricity used is very small. The back-pressure thrown by the meter is from 0·15 in. to 0·5 in.

It was hoped that the meter could have been tested on crude gas before this paper was prepared, but the delay occasioned by the voltmeter made it impossible to do this, and give a reasonable period of test on purified gas. Nevertheless, there is every reason to believe that it would prove satisfactory, as the orifice plate is so thin (1·32nd) that a deposit of tarry matter sufficient appreciably to affect the registration of the meter is unlikely; and a deposit of tarry matter on the pipe itself, reducing its diameter relative to that of the orifice plate, would only give a very small factor of inaccuracy, because it would merely modify the coefficient of the orifice to a very small extent.

COST.

As regards the cost of the meter, I give below particulars of what we paid for the various parts:

	£	s.	d.
One low differential meter body with mercury resistance element, valves and fittings, and panel	250	0	0
One orifice plate with ⅜ in. connections	9	15	0
One rotary converter	35	0	0
One voltage regulator	60	0	0
	£354	15	0

DISCUSSION.

The PRESIDENT (Mr. J. M. Campbell, of Margate) said the paper had been a very interesting one, and the lantern slides excellent; but on account of the lateness of the hour, he would have to ask the speakers to be as brief as possible in their comments.

Mr. L. J. LANGFORD (Tunbridge Wells) remarked that last year they were indebted to Mr. Hoyte for a valuable paper describing an ingenious apparatus for recording at the works. Now they were equally indebted to Mr. Terrace for bringing to their notice an electric flow meter. In both cases electricity was the medium of registration, and in many respects the instruments appeared to be identical. Though, as the author stated, the drum type of station meter might still be used universally, there were disadvantages attaching to it, the chief being heavy cost, big space occupied, and a building to house it; and these disadvantages were perhaps the reason why inventors had turned their attention to perfecting other methods of registration. Their attempts had been praiseworthy; but the fact remained that they were still tied to the old drum meter. It was very reliable and very simple. Could the same be said of the electric meter? The author stated that highly sensitive electrical instruments were required; and this might mean that they would require overhauling and calibrating frequently. This difficulty, however, might be overcome, so that there might be no trouble in this respect. At a cost for current of 6·4d. per unit, the expense of registration was rather high, which was an important matter; but where alterna ing current was available, the figure would be materially reduced. The sampling apparatus shown was extremely useful, but one thing he could not understand. In taking a constant flow over 24 hours, and with varying quantities of carburetted water gas going forward, how did he get a representative sample?

Mr. P. S. HOYTE (Plymouth) said Mr. Terrace was to be heartily congratulated upon his very able paper on a subject which could not fail to be of interest to all progressive engineers. The drawbacks to the old type of station meter had already been pointed out. In an age which had witnessed so many rapid strides in engineering science, it seemed strange that the gas industry had only lately been offered a device which might aptly be termed the equivalent of the electric ampère meter. He saw no reason whatever why the gas engineer of the present day should not be in a position to determine the demand upon his various district mains with the same ease as the electricity engineer could note his feeder loads. He had an electric flow meter on order, which he was going to instal in a re-arranged meter house at Plymouth that he hoped to have the pleasure of showing the members next year. He was already registering carburetted water gas by means of a Thomas meter; and he intended to instal at least one of these flow meters to register coal gas. The connections provided means whereby the flow meter could be put in tandem with a wet station meter, for the purpose of proving its accuracy; and in this way he hoped to be able to supplement the valuable data that Mr. Terrace had put before them. The members were naturally struck by the very remarkable resemblance between this meter and the apparatus he described to the Association a year ago. He referred to Widlake's distance pressure recorder. But he could assure them that Mr. Widlake had arrived at his instrument in absolute ignorance of the flow meter. As a matter of fact, he had this flow meter quoted against him when applying for rights in the United States. In his case, however, the mercury was in a float, which rose and fell by means of the pressure of gas acting on a column of water. It certainly seemed a pity that the "Electro" meter could not register direct in units of gas flow, without the necessity of applying a variable conversion factor. He understood that a single "Electro" meter under full load took about 40 watts of electrical energy, which worked-out at about 1 B.O.T. unit per 24 hours' day. Surely motor generator and transformer losses could not account for the 4·46 B.O.T. units per day, which was the lowest figure mentioned by Mr. Terrace. Of course, Mr. Terrace purchased his electricity; if he generated it himself, it would not be so expensive. The figures quoted by Mr. Terrace as to accuracy were highly creditable; but they showed unmistakably the need of a voltage regulator—particularly in a works private supply system, in which the pressure variations were likely to be considerable. But there were other objects besides measuring the make of gas to which the "Electro" flow meter could be applied. A particular advantage attaching to the meter lay in the ease with which the body could be connected at will to either one of (say) two or three adjacent main pipe lines, provided these latter were furnished with orifice plates, in the same way as an electric ammeter could be switched into circuit with any desired feeder. He predicted that the sphere of usefulness of the meter would be quite as much in determining flows on individual mains as the actual make of gas.

Mr. G. M. GILL (London) said he had been much interested in the sampling apparatus. There was great need for the use of such samplers on many works. He expected some of them had known of works where a cubic foot of gas, taken during the day time, was used to get the therms per ton for the 24 hours. With an instrument giving a sample over the whole 24 hours, and then testing this, one would obtain a really reliable result. With regard to the flow meter, and the diagram showing the rate of flow when the gas was passing through the main, he suggested that this was really of great value, because in installing plant one had to make it large enough to deal with the maximum flow. Whatever was put in, had to be able to take the greatest glut of gas that was going to pass through it; and this meter would show the way the gas varied in flow. If any of them had taken their station meters for a short time, and put down the results, they would have been surprised at the extraordinary variation of flow in an ordinary gas-works. It was a most interesting paper.

Mr. J. FISHER (Tottenham) asked why it was necessary to use alternating current. He presumed it was for preserving the contact points in the mercury. Otherwise there was no reason why the same principle should not be applied with direct current.

Mr. STEPHEN LACEY (Gas Light and Coke Company) remarked that in dealing with a new type of meter like this, they wanted to know in the first place what experience with it there was available. When Mr. Terrace gave them information of this kind, they were able to consider a proposition with much greater confidence. He agreed with Mr. Hoyte that it would be valuable for registering the rate of flow in district mains; but a meter of this kind was really hardly required. An orifice with a sensitive pressure gauge was all that was necessary. He had installed a number of these orifice meters, which had been made and sold for some time by Messrs. Kent. As to the cost of the current, it was said to be somewhere in the neighbourhood of 1d. per hour, which looked small, but in the course of a year came to £40 or £50, which represented a capital cost of £1000. This was owing to the high cost of the current; otherwise, of course, it would not be so much. The cost of current was independent of the flow, and one could not express that cost per million cubic feet. The cost would be just the same whether it was 1,000,000 c.ft. an hour or 10,000 c.ft.; and this was an important point.

Mr. WHITEHEAD said Mr. Terrace had given them a very interesting paper. It seemed to him (the speaker) that these flow meters were all subject to at least three inherent defects. If they were required to give flow of gas, they had to be provided with an integrating mechanism; secondly, they had to be corrected for specific gravity, &c.; and, thirdly, they were liable—especially if dealing with crude gas—to be affected by deposits. Was Mr. Terrace suggesting that the meter was as good as, or better than, the ordinary Venturi tube? A comparison of cost might be about the same; but this meter cost something to run, and the Venturi meter cost nothing. An apparatus with a stepped resistance, as in this case, would give a stepped curve, and that would tend to an increase in error.

The PRESIDENT said that, on behalf of the Association, he would like to tell Mr. Terrace how deeply indebted they were to him. The lantern slides had been particularly good, and he had dealt with the matter very thoroughly. He proposed a vote of thanks to him, and this was heartily agreed to.

Mr. TERRACE said there had been comparatively few points raised in the discussion for him to reply to. He did not think the cost of calibration and repairs would be very great. The cost of registration had been raised. The quantity of electricity that would be used would be the same for 1,000,000 c.ft. as for 100,000 c.ft.; and in their case the meter was operating on a very small flow of gas. They were working under very disadvantageous conditions; and the voltage regulator consumed a considerable amount of current. There had been several references to the sampling apparatus. He could only say that it had proved of very great service in his own case; and he thought it might be useful to people who wanted an apparatus of this type to know that it could be obtained complete at a price of from £18 to £20. It was very interesting to hear that Mr. Hoyte was proposing to instal meters on his district mains; and he quite agreed with his remarks as to the desirability, in these times of difficult distribution, of knowing the quantity of gas passing through the different mains. But, as Mr. Lacey had pointed out, it was not necessary to have a meter in that case. Unless one wanted a continuous record, all that was required was an orifice plate and a delicate measuring instrument to show the difference in the pressure on each side of the orifice plate. Mr. Gill, as usual, had set them thinking by asking them to consider the rates of flow in different apparatus. Those of them who had not so far given the matter any thought, would do well to ponder over it. He himself had done so. Not being a meter maker, he did not exactly know why alternating current was used instead of direct current. He believed the manufacturers said they could use direct current, but that they preferred alternating; the reason they gave being that the instruments were much more reliable in that case than with direct current. Mr. Whitehead had raised the question of deposits on the orifice plate. It had been hoped to test this meter on dirty gas before the reading of the paper. The orifice plate was very thin, and was not likely to allow much deposit on its edge.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

A meeting was held at the Westminster Technical Institute, S.W., last Friday week, under the presidency of Mr. D. Cleave Cross (Lea Bridge), at which the following paper was read. A number of diagrams were exhibited, and working demonstrations made; and in the subsequent long discussion many detail matters of a practical character were raised and fully dealt with by the author.

GAS-METERS: THEIR CONSTRUCTION AND APPLICATION.

By ALBERT T. GILBERT.

In this paper I wish to strike a new line of thought. Much of a purely technical nature has been said and written on this subject from time to time; but to consider the meter in technical terms does not help those who have to consider what may be termed their eccentricities. It is most important that every man, whether in the capacity of buyer, storekeeper, inspector, or fitter, should be thoroughly conversant with all there is to know about them. They are the weights and scales of the business of selling gas, and the hub upon which the commercial wheel revolves. If they are false to the user, he loses in terms of £ *s. d.*; but it may mean to the supplier the loss of a consumer. If the meter is false to the supplier, then he loses in cash terms also, but to a much greater extent.

In many gas undertakings, especially the smaller ones, the meters receive much less attention than other appliances on the district; and if some one thinks a meter is causing such and such trouble, then, if there is one in stock, it is removed, but the trouble is not removed likewise. On the other hand, a meter may be left for many years so long as it shows some consumption; but one day it completely ceases to register, which is only the final collapse after perhaps years of internal, ever increasing, leakage.

It is therefore necessary to improve the understanding of meters with a view to keeping them on the district only so long as they do their job perfectly, and removing them when they do not. The legislation of the country governing the respective rights and obligations with regard to meters—of the supplier on the one part, and the user on the other—should be studied by every gas man who deals with the consumer. It is not every man, whether engineer or fitter, who knows all the various clauses connected with the subject; and it often happens that a consumer may prefer to discuss the matter with a minor official. His argument should make a settlement easier, not harder, when the matter comes before his superior officer.

LIFE OF METERS COMMITTEE'S REPORT.

Just a few words about the "Life of Meters" Committee's Reports. These are more or less in accord with my own experience, and emphasize what I have just said as to the necessity of more knowledge of the subject. Some reference is made to a term of years as the life of a meter. This is not sound reasoning, though I know some companies have all meters removed for repairs after a terms of years; others go so far as to scrap all those over ten years old. It is my object to show that the life of a meter cannot be expressed in years. Some may last twenty weeks only, others as many years; but the aim of every one concerned should be to keep them on the district just so long as they do their job properly. Meters fixed twenty-five or more years ago are doing their work to-day; but the question arises, Will the meters of to-day be doing their job as efficiently in twenty-five years time? It is extremely doubtful. These reports rather tend to show that modern gas-making practice is to blame for so many meters failing to-day; but surely it is sound reasoning to submit that if the gas has such an evil effect, it would be most apparent in the case of old meters and not the new ones. A study of these old meters should be the best guide to any reconstruction work.

With regard to the new scale of standard sizes, there is nothing in the 1, 2, 3, 4, 5, and so on, to guide us in deciding the size of meter for a particular duty, as in the old "light" denomination. Therefore I should suggest that the capacities be used always as 30, 40, 60 c.ft., and so on. These would soon become as familiar as the sizes of fires or cookers.

WET METERS.

Wet meters of the smaller consumers' variety are fast dying out. However, for large consumptions and for accuracy they still hold their own. In construction they are perfectly simple; and but for the fact that they depend upon such an unstable agent as water for positive registration, they would remain accurate, so long as the metal parts remained intact. While there is this fluid seal, there is always risk of the meter failing. The water is necessary for two reasons. Most people connect with it only accurate registration, but few realize that without it the meter would not work at all. Everything depends then upon the height of the water. If it is reduced, the meter will register against the supplier, and if added to will be against the consumer. There are only a few ways by which either of these conditions can be brought about—viz., (*a*) evaporation, (*b*) leakage, (*c*) being out of level.

With regard to (*a*)—this is caused, as no doubt you all know, by the tendency of gas to become saturated with moisture when passing over water; and this increases with the temperature. Thus, with more gas passing and higher temperature, the lower the water level will become after any length of time.

(*b*) It is obvious that a leakage of water from the meter casing may take place at any time.

(*c*) A meter may be out of level from various causes; mainly, perhaps, from careless fitters fixing them so, or from subsidence taking place at some time subsequent to fixing. I have met with two instances of this, which will explain both conditions. One was a station meter at a certain works having a capacity 20,000 c.ft. per hour. Owing to the great increase in the leakage account, it was decided to have the meter tested. The test result obtained was, for a wet meter, startling, showing 7 p.ct. fast. The meter had been fixed for 25 years. It was opened and examined, and was found to be in excellent condition, having very little coating upon the drum at all. At last the spirit level and plumb line were resorted to, and it was discovered that the meter was very much out of level; the rear portion having dropped over 3 in. and the right-hand side about 2 in. The waterline therefore had to be lowered about 2½ in. in order to bring the meter to positive condition.

In another instance a 400-lt. meter had been fixed for about twenty years with the waterline standpipe about ¾ in. lower than the datum line. The result of a test *in situ* showed it to be nearly 10 p.ct. slow. A test made after it had been set level proved it to be only 2·5 p.ct. slow. These two instances illustrate the necessity of proper supervision both when fixing meters and after.

In the case of consumers' meters with a float. These meters are very often out of level, and there is a danger not only of inaccuracy but also of complaints of "bad gas" or "insufficient supply." I have known a service pump to be sent to such a complaint when really the trouble has been that the meter was out of level. The float is generally placed at the extreme left-hand side of the meter. Therefore, if the meter drops down on the opposite side, even the smallest amount, it must reduce the range of the valve and so restrict the supply, or even shut-off the gas entirely.

The main cause of defective registration in wet meters, then, is the water level. There is, however, another cause—viz., perforation of the drum or some part of the casing, allowing gas to pass from the inlet to the outlet without causing the drum to revolve, and therefore passing gas unregistered. This perforation is caused by the action of the liquid, which becomes strong in various salts and acids, upon the sheet metal which is directly in contact with it. It has even been found that electrolytic action has been set up. This perforation, of course, is the process of years, and need cause small worry, Its effect on the registration is similar to that of the dry meter variety, and will be explained fully under that heading.

DRY METERS.

General Remarks.—The construction of the dry meter is totally different from the wet. Although it is free of that illusive agent water, yet it is really much less reliable; for a wet meter will show when the conditions are against accurate registration, whereas the dry, being entirely sealed, is more or less a speculation. Also the dry meter, having a perishable membrane for its vital part, which may be acted upon by the gas, is much more liable to failure. Especially is this noticeable in the smaller types, as the skin of the diaphragm is so thin; whereas in the larger meters—say, 20 light and upwards—the life is much longer, since the skins are thicker.

Some ten years ago there was a great agitation in certain quarters for diaphragms of a very thin skin. This has proved a great mistake, and is the cause of much of our trouble at the present day. The skins used in the thirty-year-old meters of 3-light size will be found as thick as a 20-light meter to-day.

This does not apply to all makers' meters—some are still adhering to the old paths.

There is a belief that the thick diaphragm causes slow registration, owing to the leather getting dry and absorbing too much pressure. I wish to say emphatically that there is little need to fear slow registration by dry meters unless there is an internal leakage, as I hope to prove presently. Another weak point of the dry meter is the packing on the motion rods and valve crank causing a leak at the index. There are far too many meters taken off our districts for being leaky at the index. This is most noticeable in slot meters, owing to the fact that the upper chamber is not sealed as in the ordinary type. The loss by such a leakage is purely unaccounted for, as it is not registered by the meter, but is in the same category as any other leakage. The leakage is not great—at the most not more than 1 c.ft. per hour; but it is a source of annoyance to a consumer to have a smell of gas in the house, and sometimes (if the meter happens to be fixed there) in the pantry.

Meters Passing Unregistered Gas.—This is a subject, according to my experience, little understood by the average gasman, and is certainly greatly under-estimated. Everyone knows that a meter will cease to register completely, which fact is apparent by no consumption being shown. Few people realize or understand that this is, in the majority of cases, a gradual process, commencing perhaps at half-a-foot per hour unregistered, and ending in the meter ceasing to register. The chief cause of the trouble is that some part or parts of the measuring chambers become perforated; and, of course, if this perforation will supply the demand the gas will take the line of least resistance and not work the meter. Now when one considers that, for instance, in a 20-light meter, when passing ½ c.ft. per revolution, each leather opens and closes once, or in a consumption of 50,000 c.ft. opens and closes 100,000 times, it will be realized what a tremendous amount of wear and tear there is upon this part alone in a life of (say) ten years.

We will suppose the leather has a slit round the rim of the diaphragm for a length of ¼ in. This slit may be capable of passing 5 c.ft. per hour. Light an incandescent burner, or have a few bye-passes on the outlet, and it will be found they are amply supplied without working the meter at all. This, then, may be the start of our meter being defective; and it will never right itself but continue to grow worse (say, from 5 to 10, 15, 20 c.ft. per hour and so on) until it will pass all the gas without working the meter—in other words, cease to register. A moment's reflection will show how this may be the cause of our unaccounted-for gas.

No doubt the natural question now asked will be: "How does this fact affect the accuracy of the meter when it does register?" A most important point; and I believe most people will say that, if passing 5 c.ft. without registering, when the demand is 10 c.ft., 5 c.ft. will be registered and 5 c.ft. not; at 15 c.ft., 10 c.ft. will be registered and 5 c.ft. not, and so on. This is not so. What actually happens is this. We will stick to our meter, which is a 5-light, giving 5 c.ft. per hour without registering. Increasing our demand to 6 c.ft. per hour, we may find it actually registers 5·5 c.ft., but gives 6 c.ft., or it is 8·33 p.ct. slow. Again, we increase the demand to 10 c.ft., and find it registers 9·5 c.ft., but gives 10 c.ft., which is 5 p.ct. slow. We increase to 20 c.ft. per hour and get it; but our meter only registers 19·5 c.ft., or 2·5 p.ct. slow. Then we put on its full capacity—viz., 30 c.ft. per hour—and find, perhaps, 29·8 c.ft. is registered, or only 0·66 p.ct. slow. So it will be seen that our unregistered gas resolves itself into a percentage error, until perhaps it finally disappears altogether. Now, after studying the foregoing, many may say there is not much in it, because the full load makes up for the less. Does it? Considering these are days of studying small consumptions, when we get five bye-passes for 1 c.ft. of gas, three burners for 4½ c.ft. per hour, or a gas-fire for 20 c.ft. per hour, it is surely worth considering.

Take an ordinary household with (say) a 5-light meter, with a gas-cooker capable of consuming 60 c.ft. per hour, and lighting; total, 70 c.ft. per hour. For about four hours a week for cooking that meter is worked to death with a consumption of (say) 200 c.ft. in four hours; while the lighting may only mean one burner, or two at most—say, 5 c.ft. per hour, which could easily be passed unregistered. Thus we have at four hours per day lighting, at 5 c.ft. per hour = 140 c.ft. per week, for nothing, against a cooking demand of 200 c.ft. per week. To all those who come in contact with meters I would like to say—watch the small consumption. If a small glimmer or a bye-pass alone is seen alight, carefully check the meter for a few minutes and see if the gas is registered. Don't worry about the gas-stove or ring burner; it is a very bad meter that will not register these at 20 to 60 c.ft. per hour. Don't worry about your dry meters being slow, as this seldom happens to any extent unless the meter is passing unregistered gas. So I say, Watch for unregistered gas always, and in all circumstances.

Dry Meters and Inspection.

I have seen lists of dry meter tests from time to time, showing particulars of slow, fast, &c., where such meters have been removed for company's reasons, such as the following:

Ceased to Reg.	Correct.	Slow.	Fast.	Number Tested.
114 ..	92 ..	112 ..	126 ..	444
14 ..	2 ..	5 ..	2 ..	23
103 ..	35 ..	45 ..	28 ..	211

These results are all very well from some standpoints, no doubt; but if these are analyzed, I think it will be agreed that they do not indicate real supervision. The great percentage correct should have been left on the district; those slow are almost balanced by the fast; those which ceased to register should have been discovered before they reached the acute stage. This last point brings us to the matter of inspection. It should be little credit to a man to have to report a meter "stopped"—no more than to a doctor to report as dead a person whom he has been attending for years and never reported as sick.

How often do our index readers walk into premises where lights are burning, or even light a burner alongside the meter they are inspecting, and yet do not stop to see whether the meter is working? I know in many undertakings the men are not expected to look for this, but are treated merely as machines—reading their 120 meters per day, or whatever their allotted task may be. This may be in order, if their day's work is thoroughly examined afterwards and the doubtful ones followed up immediately by a test *in situ*. This means going over the ground twice where the one call should do, and also causes an additional bother to the consumer. A quite simple test can be carried out by the one man, without the consumer being at all suspicious. It could even be made a regular test at each call—any small burner would suffice, the smaller the better, so long as the meter worked through a revolution or complete action of its mechanism.

There are some undertakings which have a department for dealing with queries, as they are called; and I believe it is found to be quite satisfactory from all points of view. One great point in its favour is that it turns doubtful meters into certainties, reduces the chance exchanges, and allows less meter stock to be carried—a most important item in the face of ruling prices. It means, too, that the inspector is relieved of one of his chief worries, and is able to devote his energies to more important work. There is no doubt also that such a department reduces the leakage account, and gives the distribution engineer a feeling of confidence; for at least he can say: "My meters are well looked after." In this connection I have some figures showing the consumption on old meters before removal and that on their successors, comparing corresponding quarters. There were 78 meters exchanged, and the total gain in gas was 844,000 c.ft., an average gain per meter of 10,800 c.ft. Assuming that the cost of finding each meter was 2000 c.ft., then the net gain per meter was 8800 c.ft.

I have often heard it said that large meters are the worst offenders, for the testing regulations allow them to pass so much without registering. There is little need for anxiety about this, for they are by no means the bad offenders, as the following table will show. All were over 100-lt. size, and tested *in situ*.

Tested.	Correct.	Fast.	Slow.	Passing Unregistered Gas.
200 ..	78 ..	69 ..	9 ..	44

The Prepayment Meter.

We will now consider that useful development of the dry meter commonly known as the "slot," or more correctly the dry meter with a prepayment attachment. The principle upon which the various makers have constructed their meters is that of a coin placed into a pocket, and operated by hand, which acts as a connecting member between a drum which is free to revolve and engage the teeth of a wheel. This wheel moves a carrier a certain distance, which engages a lever connected to a valve placed at the inlet to the meter. The valve opens, and gas begins to flow through the meter. As the gas is registered, the action of the meter returns the carrier and closes the gas-way into the meter.

It must be remembered that there are two distinct parts—an ordinary meter, and an attachment consisting of a number of metal wheels and levers. Therefore the latter can hardly vary from their original setting except for fair wear, whereas the former is liable to failure from the causes already explained. The question that arises is: What effect have these failings upon the cash returns in the meter box?

Let us take the fast meter first. Does this affect the returns? It certainly does not. The closing of the valve, or in other words the shutting-off of the gas supply, is operated by the meter to which it is attached, not by a standard outside the meter. Therefore, if the meter indicates that 5 c.ft. have passed and the prepayment part is set for 5 c.ft., then the gas must be stopped. It is exactly the same in the case of a meter which is slow. The point to notice, then, is that the cash in the box is no indication as to whether the meter is correct or otherwise. The real acid test is when that meter is—or should I say when the cash is?—compared with the station meter. Then the error is apparent.

Many may think this wrong, for often meters show a greater amount consumed than is accounted for by the cash returns. I know such cases do happen; and it can always be traced to the prepayment mechanism. What I want to emphasize, however, is that it is no use sending such meters to be tested, as in cases I have known.

Where the meter shows short returns, the best test to be applied is the burning-off test. This can be easily done *in situ*; and I have found it saves quite a big percentage of the meter exchanges. If a meter is set (say) for 16 c.ft. for a penny, then the valve should shut-off when this amount has been consumed. It is an easy matter, therefore, for a man to light-up a stove and burn-off this amount as registered by the meter. It may happen that the meter will show more than the 16 c.ft., in which case the meter must be exchanged. But should the valve close at 16 c.ft.,

there is no need to do so, and probably the meter may last for years and give no more trouble.

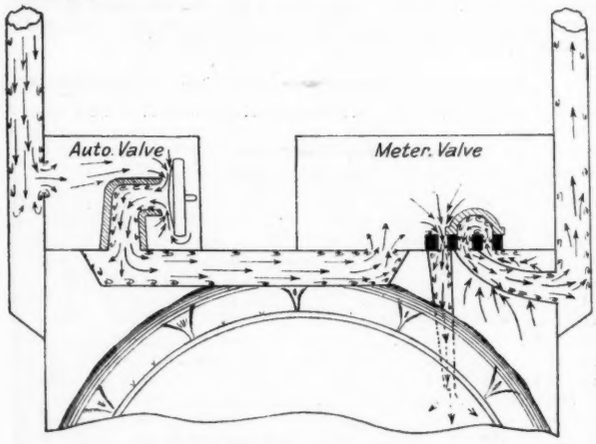
The point which concerns us most is, To what extent does the internal leak or unregistered gas affect the cash returns? Only in a similar manner to the way it affects the gas account in the case of an ordinary meter. It can be best illustrated by this model. It will be seen that 5 c.ft. per hour, or sufficient for one burner, is being consumed but not being registered; yet if the amount is increased to 6 c.ft., then the meter takes up the load. Thus a dishonest consumer could use one burner for nothing. But if a ring were in use, the meter would work. Now if a man is sent out to such a meter and applies the burning-off test, he should discover the defect right away, because the valve would not shut off. Here, again, the collector should be the man to find out such cases. It would be quite easy for him to have a burner lighted while counting the coppers, and see when he had finished whether the gas had been registered.

The question naturally arises as to what does cause the cash to be short, for we all know it is a common complaint. It is generally in the gearing of the prepayment mechanism. There may be some "back lash" through wear, which has to be taken up before the valve will open or close. Thus the valve may open a certain distance timed for 16 c.ft.; but the meter may have to register 18 c.ft. to close it. If this happens with eight coins, then the cash returns must show 1d. short; if 48 coins, then 6d. will be short, and so on. It would be quite safe to estimate that 75 p.ct. of the slot meters are worked mainly upon one coin; so this may account for so many of these complaints. Often a meter which has been working under such conditions and giving short returns, if removed to another address, would act quite well.

SLOT METERS AND RESTRICTED SUPPLIES.

Most district men know that where there is a slot meter, the supply is quite inadequate for the appliances. This applies to some of the contract work carried out in the old days, where we had a 3-lt. meter, several lighting points, about 20 or 30 ft. of ½ in. pipe, and a cooker at the end. Now the average 3 lt. meter which we have on our districts to-day will deliver, with 5-10ths absorption of pressure, about 30 c.ft. per hour—enough, we will say, for the oven only. With 10-10ths drop it will deliver 75 c.ft. per hour; and with 15-10ths drop, about 90 c.ft.

The following diagram will illustrate where this loss of pressure takes place:



We endeavour in our distribution systems to avoid as far as possible any undue restriction of supply by causing the gas to change direction too suddenly, and a return bend is rarely used; yet notice how often the direction is changed in the meter—ten times in a distance of as many inches. Is it any wonder that we get trouble?

I have made tests to endeavour to trace where this loss of pressure takes place. By cutting out the mechanical part entirely and just passing gas through, I arrived at the following results:

Pressure Drop. Tenths.	Meter Gasways. Cubic Feet per Hour.	24i-n. Straight Tube. Cubic Feet per Hour.
5	70	140
10	90	160
15	110	180
20	130	200
40	150	240

Entire Meter.

	Gasways and Moving Parts. Cubic Feet per Hour.
5	45
10	75
15	95
20	120

Now just imagine an initial pressure at the works of 35-10ths, and 30-10ths at the house. The meter absorbs 10-10ths or 15-10ths of it, and the pipes take another 10-10ths. Thus we may then get 5-10ths at the cooker, which requires 25-10ths for complete combustion. This is not by any means an exaggerated case. I have seen worse, I can assure you. Under these conditions, is it to be wondered at that the slot consumer is our worst worry?

My remarks, I know, have been very simple and elementary; but they have served their purpose if only they set our ideas in order on this subject, which may develop into more involved and serious study. I am also hoping that many points which I may have missed or not made quite clear will be brought out in the discussion.

DISCUSSION.

The PRESIDENT, in inviting discussion, pointed out that Mr. Gilbert had been specializing for some considerable time on the subject with which he had dealt. He was to be congratulated upon his highly practical and interesting paper. He could hardly agree with him in saying that the men who went round taking the indices, and the collectors, should spend so much time testing meters. This, he thought, was better left to others to do. At the same time they could do a lot to help by making inquiries likely to be of use to those who would have to take the matter up afterwards, when, on going round, they noticed a decreased consumption as compared with the previous year. Those who had any experience of these inquiries knew that they were apt to be a very delicate matter. Many peculiar reasons were given by consumers for differences in the amount of gas registered. It would be difficult to test with one burner, because, when the man happened to call, the cooker might be in use, and the consumer would hardly like to shut it off while the test was made. What had been said, however, showed that this was a matter which must not be neglected. He was afraid that in the case of some of the smaller companies, meters were to a great extent left to look after themselves. The bigger companies could, and did, afford to test their meters. One thing that Mr. Gilbert had not touched upon was the question of temperature, which also had a very large bearing upon unaccounted-for gas. When one realized that a drop in temperature of only 5° would make a difference of 1 p.ct. in the registration, the importance of this matter would be understood. Taking out the temperatures this year, and comparing them with those of the autumn of last year, he had found frequently a difference of as much as 10° to 12°; and a variation of this kind at the meter would mean a difference of 2 to 2½ p.ct. in the registration. He agreed that styling meters 1, 2, and 3 was not very helpful, except to specialists; it would be better to know them by cubic feet. An indoor man did not talk of his station meter as "so many light," or by a number. He knew it by the capacity per hour.

Mr. S. B. CHANDLER (South Suburban Gas Company) said that of all appliances used by gas companies to assist in the sale of gas, he took it the most obscure, most neglected, and most unthought-of was the gas-meter. As to scrapping meters, he would not have thought that some companies went so far as to scrap meters after ten years' service. One had to consider the very heavy capital cost imposed by such action. He had worked-out a small calculation, assuming gas was reckoned at 60° Fahr. If they had a gas-meter which stood at a temperature of 40° throughout the year (and in many cases meters were put in positions having low temperatures), the difference of 20° meant that for every 1000 c.ft. of gas registered on the consumer's meter, the gas undertaking sent out 1040 c.ft. This agreed with the President's percentage. This was a very serious item, and led one to suggest that, in considering the position of a meter, it should always be borne in mind. He agreed with Mr. Cross as to the duties of the slot-meter inspectors. They should not have anything added to their already responsible duties. Mr. Gilbert said "imagine an initial pressure at the works of 35-10ths." He fancied that it was normally considerably higher than this.

Mr. S. A. CARPENTER (North Middlesex Gas Company) expressed a wish to hear Mr. Gilbert's views on therm matters. Was he in favour of converting the existing meters to register therms, and, if so, what would roughly be the cost of the conversion; or, alternatively, did he think it would be better to go back to the old system of charging?

Mr. D. J. WINSLOW (Lea Bridge District Gas Company) remarked that, when one came to reflect upon the matter, it was a marvellous thing that the gas-meter was now practically the same as when it was first invented. He had had a meter brought in a fortnight or so ago, and the date upon it was 1863. The makers, however, informed him that there was practically very little of the original meter there. He had really been much struck with Mr. Gilbert's tests, and the large proportion of meters he had found fast. The author said the slow ones were almost balanced by the fast. Personally he had not found this. It was only within the last seven or eight years that they had had any experience of fast meters; and the amount of error had been very slight. The fast meters came out at about 4½ p.ct.; whereas the slow meters were very much the other way. Had Mr. Gilbert a scheme for testing *in situ*, other than the ordinary method. As to the number of years before a meter was changed for official testing, assuming a gas company had a not unduly high unaccounted-for gas figure, he believed from seven to ten years was the average time when it was advisable that a meter should be tested, irrespective of any inquiries that might be made. With regard to scrapping meters after ten years, it had to be remembered that often the cost of repairing them was 75 to 80 p.ct. of the cost of new ones.

Mr. E. HAMMOND (Gas Light and Coke Company) remarked that it must be a very poor shilling-slot meter that took sixpennyworth of gas in shutting-off. Referring to meter reading, he said 120 meters per day was not a large number. He had known instances in which 200 meters had been read accurately. About 180 was recognized by at least one manager as a regular day's work, which he did himself. Stoppage of meters was generally due to the valves. As far as the collector testing meters was concerned, this was impossible. They had quite enough to do without that.

Mr. J. R. GALE (North Middlesex Gas Company) said in one case he had found no consumption was registered in a quarter, as against 15,000 c.ft. for the corresponding period; and the people told him they had been burning gas as usual. The meter was tested, and declared fast. In another similar case of nothing being registered, the meter was found correct. It was rather awkward to take a certificate of this kind to the consumer; but it had to be done, and fortunately

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At maximum flow of water, temperature is raised 60° Fahr. in 15 seconds.

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Automatic valve prevents any supply of gas unless water is flowing.

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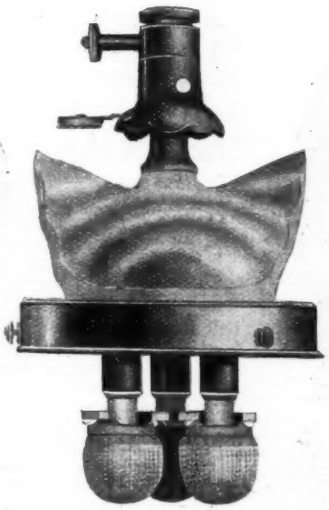

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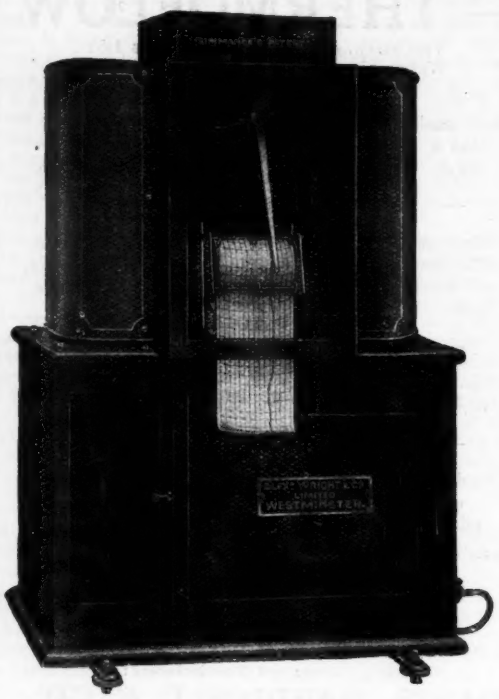

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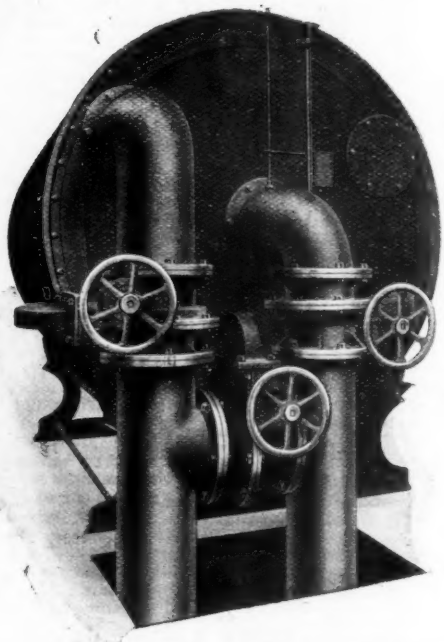


No. 16a.—BACK VIEW OF ROUND METER, WITH SLIDE VALVES AND BY-PASS.

J. & J. BRADDOCK, (BRANCH OF METERS LIMITED), **GLOBE METER WORKS, OLDHAM**

Telegrams: "BRADDOCK OLDHAM." Telephone No. 815.

AND **45 & 47, Westminster Bridge Road, LONDON, S.E.**

Telegrams: "METRIQUE LAMB LONDON." Telephone: No. 2412 HOP.

the people were reasonable. He would be glad of an explanation of this.

Mr. R. J. BEHENNA (Gas Light and Coke Company) said they had heard a portion of the unaccounted-for gas put down to the fall in temperature, and meters being in cold places. Did this really occur to any extent? Consider the case of the average householder, now, with a 10-light meter, and a cooker taking from 40 to 60 c.ft. an hour, or at another time a 30 c.ft. fire going. Did the gas have sufficient time, in passing through the meter in this cold place, to get the drop in temperature which had been referred to? Anything near 2 in. loss of pressure of gas passing through a meter seemed to him an excessive amount. He had frequently found meters work with 2-10ths or 3-10ths loss; and with 5-10ths or 6 10ths, he should think it would be time to look into the matter. As to automatic meters, and the case of the first coin, he could assure them that with his meter at home he got full pressure for a 10-in. fire up to the last 5 or 10 c.ft.

Mr. A. W. MAYO (North Middlesex Gas Company) referred to a 10-light meter which, when the consumption was about 35 c.ft. per hour, registered quite all right; but as soon as the consumption was increased to 60 or 70 c.ft., it ceased to register.

Mr. J. E. DAWLING (Gas Light and Coke Company) quoted an instance of a 50-light meter being 42·86 p.ct. fast, and another similar one being 46 p.ct. fast.

The PRESIDENT, on the subject of temperature, said that, of course, the temperature of the gas did not drop as it was going through the meter; it had already done so before it reached that point. If the gas was passing out from the works at 60°, it might have fallen to 40° before it reached the meters.

Mr. GILBERT, in the course of a detailed reply, said he had found meters on the district 27 p.ct. fast, and he thought this was pretty big. With regard to the therm, this was outside the question they were now considering; but still, it was a very interesting point. If they registered and showed therms on the dial, their meter would immediately become an inferential meter; and they were not allowed at present to fix inferential meters. He thought the real idea of introducing the therm was to place their business on such a footing that comparison could be made with a unit of electricity. They could say that a therm would do a certain amount of work. For instance, with a gas-fire it would give a definite result; and this efficiency could be compared with a unit of electricity. From that point of view, it was a very good thing. Let them declare their quality, but still go on charging per 1000 c.ft. He could take them to a place at Woolwich where there was an 1867 meter which had never been removed. If old meters could stand the gas like this, surely the new ones might be expected to do the same. With regard to meters being fast, there was a list published in the August issue of the "GAS SALESMAN" which might prove of interest to them. This list included meters 19 p.ct., 22 p.ct., 12½ p.ct., 30 p.ct., 50 p.ct., 37 p.ct., and 17·6 p.ct. fast. The old Gas Act said that a meter had to be tested at 5-10ths. Now they were having them tested at 20-10ths pressure. If a meter had to be tested to satisfy a consumer or a gas company, it should be tested under the same conditions as it was when new, before being fixed. This was a point that ought to be raised. If the repairs cost 75 to 80 p.ct. of the cost of a new meter, he should say there was something radically wrong. One speaker did not agree with the differential of 2 in.; but in the paper he had given actual figures. If they could get a meter to work without any loss of pressure between inlet and outlet, they would never have the diaphragms perforated. It was the differential pressure thrown on the membranes that fractured them. Mr. Gale's point was rather interesting. Of course, they did come across puzzlers like this from time to time; and this was where a repair shop for companies dealing with (say) upwards of 10,000 meters should be of value. The lessons to be learned thereby would certainly be worth something. There was no doubt that the meter makers were moving, and that they would have better meters within the next five years than they had ever had; but he had been talking about existing meters.

A hearty vote of thanks was passed to the author, on the proposition of Mr. CHANDLER, seconded by Mr. F. E. WOODFINE (South Suburban Gas Company).

Blind Soldiers as Telephone Operators.

Universal as is the sympathy with the wonderful work accomplished by St. Dunstan's for the men of the Imperial Forces who lost their sight in the war, those of us engaged in business life are particularly impressed with the efficient and thoroughly business-like lines upon which this great organization has always been conducted. It is St. Dunstan's proud boast that they have made "useful citizens again" of nearly 2000 war-blinded men; and we gladly direct the attention of employers among our readers to the way in which very practical help can be given to St. Dunstan's work at the present moment. Many of St. Dunstan's men have been specially and very thoroughly trained as telephone operators, and have filled positions all over the country in this capacity with a success which can be vouched for on the authority of letters from many employers. Five or six of these men are waiting for positions at the present time. They are mainly late arrivals to St. Dunstan's who have just completed their course of training; but they include also one or two who have had the misfortune to lose their positions through trade depression and the consequent closing-down or reduction of staff. St. Dunstan's always endeavours to secure positions for its men as near their own homes as possible; and Manchester, Liverpool, Bristol, and London are the areas in which it is at the moment desired to find positions for the men. However, the Secretary of St. Dunstan's After-Care Organization at the Headquarters of St. Dunstan's Work, Inner Circle, Regent's Park, N.W. 1, will give every information to firms who may be able to engage a blinded soldier as telephone operator. We do not think it over-optimistic to expect that St. Dunstan's will have offers of more positions than they can find men to fill.

MAKING GAS AND WATER CONNECTIONS UNDER PRESSURE, AND THE USES OF SOME MODERN TOOLS AND APPLIANCES.

By A. BELL, Morpeth, Messrs. E. PASS & CO., Gas and Water Engineers, Denton, Lancashire.

[A Paper read before the North of England Gas Managers' Association Auxiliary Meeting, Nov. 25, 1922.]

It was my intention to give you a brief paper on the above, and follow it up by actual demonstrations of several of the tools and appliances; but as we are holding the meeting at the offices and not in the workshops, I shall have to content myself with giving a description of some of the methods I advocate, and showing you the appliances we use in the various connections. I have prepared, as complete as possible, working instructions for the drilling apparatus, retort mouthpiece facing machine, and details of the new gas-main stopper, and will endeavour to explain the simplest ways of making larger connections, and also the methods of using our small machine for inserting small water connections and for making special connections on high-pressure gas-mains.

MAKING GAS AND WATER CONNECTIONS UNDER PRESSURE.

I will describe, with as little detail as possible, the way to carry out the work on sound and practicable lines, and in every way more cheaply and safely than is possible by breaking-out. No doubt all are acquainted with the method I am about to put before you; but it is surprising how few undertakings have considered its uses. It will be seen, by the split tee, how the machine can be used, and also, if necessary, a valve can be fixed on same. In all cases for water connections a valve is essential. I have a few prints of valves inserted in the line of gas main; but it is only fair to remark that the matter of inserting these is costly, owing to the special valves and machinery that are required. When you have to choose between shutting down your plant or cutting off your supply, however, the question of cost is no doubt of a secondary consideration.

The advantages of under-pressure methods are as follows:

1.—Cheaper, quicker, less excavation, no loss of gas, and entirely safe in every way for workmen and property.
2.—No drilling for gas bags or for bye-passing, no breaking-out or weakening the mains.
3.—No interference with the supply. The question of high pressure need not be considered.
4.—Reduces risk to a minimum.
5.—Work can be carried out at any hour of the day or night.
6.—When completed, the work is much more satisfactory.

WORKING INSTRUCTIONS FOR CENTRAL-ACTION DRILL STANDS.

Bare the main and clean of corrosion. Take drill stand in your hands and push one of the chucks through the barrel so that chuck protrudes about an inch through on the underside. Turn the stand upside down, and place the leather seating provided in position, place drill stand and leather seating together on the main. The chuck will hold the leather seating central with the bore of stand while the latter is being clamped to the main with chain. See that stand is rigidly fixed in the position desired. Now remove the chuck from barrel. See that the head of the drill tap and the taper hole in tap chuck are free from grit and dirt before mounting the size of tap and drill required. The set-screw in the side of the chuck does not require to be screwed hard home—screw it very lightly, as it is there only to prevent the drill tap from falling out when being handled. Clean the stand barrel and chuck of grit. Now oil or grease the chuck and place in the barrel of the stand; put on the ratchet brace, making sure that it is the right way up to drive the drill in the same direction as the hands of a clock. Swing in position the bridle, feed the drill with the left hand, using just sufficient pressure to prevent the drill being turned backwards with the back thrust of the ratchet—turning a drill backwards is frequently the cause of the cutting edges being damaged and sometimes wiped off entirely. Drive the tap well home. When finished, swing bridle out of position, reversing the ratchet brace to screw back the tap, remove the ratchet brace, mount the required plug into the plug chuck, remove the tap chuck from the stand barrel with the left hand, and instantly replace with the plug chuck. The loss of gas when making the change should be scarcely noticeable. It will not be necessary to use the feed screw to screw-in the plug. When the plug is inserted, release the steel rod, pull up the plug chuck, remove the stand, and connect the service pipes at your leisure.

SPECIAL POINTS TO WATCH.

Never tighten up the chain without first releasing the feed screw when drilling.
Never turn the drills the backward way.
Never feed the drills too fast or use great head pressure if the drills do not cut easily and well. It is a sign they require touching-up with a hand carborundum sharpening slip.

INSTRUCTIONS FOR WORKING PATENT RETORT MOUTHPIECE FACING MACHINE.

First take off the gear wheel and working handle, then screw the two setting strips provided to the front of the cam (the set screws go through the holes in the cam). This done, hoist the machine into the mouthpiece, and so regulate the gripping screws in the back plate that the cam is equidistant at all points to the shape of the mouthpiece, if necessary filling the blocks or setting screws to suit the curvature of mouthpiece, and at the same time see that the setting strips are dead against the face of the mouthpiece. In this position finally screw up the gripping screws. The results obtained depend upon the rigidity of the machine, and how carefully and well the setting is done. Now remove the setting strips, put back the gear wheels and handle, and manœuvre the cutting tool box so that the point of the cutter just grazes the face of mouthpiece at as many points as possible all round the face. Next move the tool box parallel with the face towards the outside of the mouthpiece until the point of the cutter is free of the edge of the mouthpiece all round the outside, screw the tool box forward $\frac{1}{32}$ in., and turn the handle in the direction that moves the cutters automatically from outside to inside across the face. Should the mouthpiece not be trued all round, move the tool box back again to the outside and put on another cut of about $\frac{1}{32}$ in. Some mouthpieces might require three cuts. Remove tool marks left by the machine by scraping. To bed the lids to the face of mouthpieces that have been machined, red-lead the face of mouthpiece and close the lid. TLis will show where the lid is hard on. Chip off with chisel, and repeat the operation until the lid beds evenly all round.

A fitter and his labourer should complete four mouthpieces per day of ten hours, or per ratio of hours worked, including the bedding of lids. It is essential that the cutting tools are kept in good condition and ground to the right shape.

PARTICULARS OF CABELL'S GAS-MAIN STOPPERS.

The advantages and saving in time and expense which arise by the use of stoppers in laying gas-mains are not fully realized by many undertakings. This may be due in part to the fact that their uses have not been sufficiently demonstrated, or that some types of stoppers, not being entirely satisfactory, have after trial been discontinued. The advantages claimed for this stopper are: (1) The front guide, being fitted with roller guide wheels, ensures easy movement and at the same time keeps the rubber disc in correct position; (2) its unique and outstanding feature is that it can be drawn round bends from 1-64 to 1-4 radius; (3) it can be used for pipes of English or metric standard measurements; (4) the only wearing part (the rubber disc) can be replaced at a reasonable cost; (5) the saving in bag holes is great; and in order to make the claim for stoppers still more convincing, the following example is given: 400 yards of 6-in. main is to be replaced with 9-in. There are, on an average, twelve services in every 40 yards, which is the amount proposed to be laid per day. Working without a stopper, the method of procedure would be to break down, drill, and tap holes for the rider, bag off, disconnect services, and proceed to lay new pipes. Unless additional bag and rider holes are prepared, the work of filling-in cannot be commenced until the whole 40 yards is laid; and, what is still worse, the consumers are all without gas during the greater part of the day.

By using a stopper, the following method of procedure would be applied: Having broken down, carried over the rider, bagged off, disconnected the services, and taken out the old main, before laying the first pipe the stopper would be inserted at the spigot end and pulled through to within a few inches of the socket end, the pipe placed in position, the joint made, and the services reconnected. The bag can now be removed, the joint and service connections tested, and the filling-in commenced. As each pipe is laid, the stopper is pulled forward.

From the foregoing, it will be seen that the number of bag holes and plugs required is reduced to a minimum, and the consumers *en route* can be given a supply much sooner than the old method will allow. The saving in labour and plugs on the case quoted would more than pay for the cost of the stopper. Finally, you are immune from trouble frequently caused by bags bursting.

In conclusion, I wish to thank Mr. Bagshaw and Mr. Batt for their generous assistance, and trust this paper has been of some interest to you all.

DISCUSSION.

Mr. H. P. FALL (Sunderland) opened the discussion, and said he noticed that in the photographs of the inserted valve this was in the horizontal position; this meant a large excavation.

Mr. W. BATT, jun. (Newcastle), remarked that, speaking generally, it took longer to cut a hole by machine than it did by hand. It took about 22 minutes with the apparatus; whereas a man could cut and tap the hole in 10 minutes. To cut a hole in a main they must take into account the gas lost. He had found the drilling apparatus very satisfactory, although the drills at first were not quite the thing; but Mr. Bell came along and supplied drills which met all their needs.

Mr. H. P. CHANT (Redcar) was of opinion that, in regard to saving gas and the apparatus as a whole, any little extra time taken was well spent. The lives and the health of the workmen were very important; and altogether the apparatus did its work better than by hand.

Mr. J. E. MOFFETT (Sunderland), as a user of small drill standards, both for low and high pressure mains, thought drilling by machine was far preferable to cutting holes in the old-fashioned way. They also obtained a better hole. When the hole was cut with a chisel they did not get as good a result as when the drill bored the hole parallel all the way through.

Mr. W. W. WELLS (Newcastle) said they had found the apparatus very satisfactory.

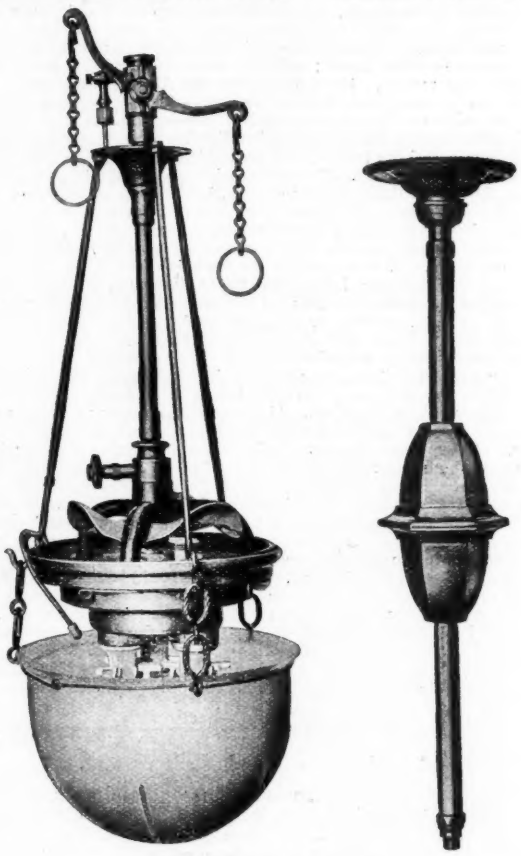
Mr. H. J. SMITH (Consett) also contributed to the discussion.

The CHAIRMAN, in closing the discussion, said they had all been greatly interested in Mr. Bell's paper, but he must confess he was rather disappointed that the author had not given some description of drilling 18-inch holes in 24-inch mains—something larger than he had described. He would like to ask Mr. Bell if he was able to guarantee that, in drilling a 24-inch main, the section of main would be entirely withdrawn from the hole and would not drop into the gas-way. This seemed to be a drawback to the underground drilling apparatus.

Mr. BELL replied to the discussion. In regard to the difference which had been mentioned as between the time occupied in hand-drilling and machine-drilling, he did not challenge the difference; but he was afraid there must have been something wrong with the drills. In answer to the Chairman's question as to losing a piece of the main in the gas-way, he said he had never lost a piece in the manner indicated.

ARTISTIC GAS-FITTINGS BY PODMORE.

IT has often been said that a side of the gas industry to the importance of which sufficient attention is sometimes not paid is that of lighting. For good lighting, of course, good burners and



A New Pattern Gas-Fitting.

fittings generally are essential. Complete and lasting satisfaction cannot be expected from fittings of an inferior character. Points that go to make up a good burner are that it should be strongly made; that it should have means of regulating the gas and air ways so that a perfect flame can be obtained with all grades of gas, and that it should have a dust-proof bunsen. The "Ivex" burner manufactured by Messrs. A. E. Podmore & Co., of No. 34, Charles Street, Hatton Garden, London, E.C., which is the result of much experimental work, embodies all these features, and must therefore prove of material assistance to the gas industry in the cultivation of the lighting load.

The "Ivex" burner is manufactured from the best materials, by skilled workmen, and is to be had in several finishes. The corona is standardized, and made to take the stock sizes of glassware or silica cylinders or globes. It is, Messrs. Podmore point out, the only burner that takes-in its primary air below the outlet of the products of combustion. The air is drawn through three tubes, attached to the corona band, to a central mixing chamber above the head of the burner, and is consequently superheated. Each of the three ports has a shutter arranged to slide along and cover-up the inlet, so that the burner can be used over the widest range of requirements for varying qualities of gas. It is also constructed to take nozzles for bijou, medium, or universal mantle

and Mundus. This is certainly a great advantage, for it does away with any need for stocking quantities of burners for different sized mantles. A thoughtful innovation on the part of the makers is a stop on the nozzle, which prevents the accident of over-running the seats for the mantle support when putting on new mantles. Further, by unscrewing the nozzle, a multiple super-heater box can be fitted for those who desire a cluster light. The many good features of this burner have already been emphasized in the pages of the "JOURNAL," but opportunity is taken of referring to the "Ivex" again now, because we have just seen it under new conditions.

A good and highly serviceable burner in itself, it is even more attractive when taken in conjunction with a new series of fittings that have been produced by Messrs. Podmore. The main features of these fittings (finished in oxidized copper or oxidized silver) will be gathered from the accompanying illustration. They are arranged with the "Ivex" burner applied to cluster lighting, for places of worship, stores, schools, board rooms, &c.; or with single mantles, for domestic illumination. Apart from this, the choice which these artistic fittings afford is a wide one. They can be used for shadowless lighting with an opal or silica bowl, the method of attachment of which is by three swan-neck hooks, which link into a chain attached to the ring of a registered design "spider fitting." For those who so desire, the fittings lend themselves as readily to bead fringes or silk shades. This adaptability is another point in their favour. A bye-pass tap may be included; and it may be pointed out that the tap is made of the best material, without any knighting pin—the on-and-off stop being formed by the metal in the body of the tap.

It only remains to be said that the pendants, as well as the burner, bear evidence of the good material and workmanship with which the firm always aim at associating their products.

Wood Fuel Suction-Gas Plant.

A saving of over £3000 per month as against the old steam plant has been secured at the Lonely Mine, in Southern Rhodesia, by the installation of Crossley wood fuel suction-gas plants and "Premier" gas-engines for driving the electric power plant. Publication No. 2229 of the Premier Gas-Engine Company, Ltd. (Crossley Bros., Ltd.), Sandiacre, near Nottingham, gives an illustrated description of the installation, which, as far as the gas-producing plant is concerned, is of special design, in four units of 350 H.P., giving a total capacity of 1400 H.P. But as each unit is able to take overload up to 450 H.P., any three units can meet the total power requirements, leaving one unit as a stand-by. These gas plants serve four "Premier" multi-cylinder horizontal gas-engines, three of which are of the four-cylinder type, direct coupled to alternating-current generators, while the fourth, which has three cylinders, drives a large air compressor direct through a flexible coupling. There is a big overhead platform built round the gas generators, from which the wood fuel is fed into the hoppers. The wood used is about 10 in. in diameter, and is cut into 2 ft. pieces. The feeding hopper at the top is of the air-lock type. The hot gases as they leave the generator first pass into a wet scrubber, where they are washed and cooled. Within this wet scrubber much of the tar coming over with the gas is condensed and carried away by the cooling water into settling tanks, where it collects, and is afterwards removed; the effluent water ultimately flowing away in a comparatively clean state. The cooled gas leaves the scrubber at the top, and descends through vertical piping into a centrifugal tar extractor, running in ball bearings and direct driven by an electric motor. Here further traces of tar and tarry deposits are effectively removed from the gas, which then enters the dry scrubber. The makers' guarantee, with dry wood fuel, at full load, was 2 lbs. per B.H.P. hour. To ensure steadiness under all conditions of working, a uniform quality of gas must be supplied to the engines; and for this reason a special arrangement of equalizer-pipes was introduced between the dry scrubbers. The four scrubbers are first coupled together in pairs by means of overhead pipes, and these pipes in turn are coupled together and lead into one common main delivery pipe. The gas is of a standard somewhat above the average for producer gas.

A lecture on "Centrifugal Pumps as Applied to Heating Installations" is to be given by Mr. A. H. Barker, B.A., B.Sc., Wh.S. (the President), at a meeting of the Institution of Heating and Ventilating Engineers, to be held at the Engineers' Club, Coventry Street, W., next Friday evening, Dec. 8, at 7 o'clock.

"B.C.G.A." Service Folder No. 4 deals with selling gas for heating, and contains material that should prove invaluable to those engaged in this branch of the industry. There are specimen circular letters, specimens of publicity literature, a pamphlet entitled "Points for Salesmen on the Various Aspects of Gas Heating," a supplement of gas heating advertisements, and a schedule and price-list of "B.C.G.A." literature.

At the first ordinary meeting for the present winter of the Royal Society of Arts, medals were presented for the papers and lectures given during the last session. They included one to Mr. E. V. Evans, O.B.E., F.I.C., Chief Chemist to the South Metropolitan Gas Company, for his paper on "Some Solved and Unsolved Problems in Gas-Works Chemistry," and one to Prof. W. A. Bone, D.Sc., Ph.D., F.R.S., for a contribution on "Lignites and Brown Coals, and their Importance to the Empire."

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Low-Temperature Carbonization and the Therm.

SIR,—I have perused Mr. Evetts' letter in your issue of the 29th ultimo; and in order to put the claims of low-temperature gas clearly, I would state:

(1) Mr. Evetts' method of calculating the thermal value of the mixed gas is the correct one, and was applied in my subsequent figures.

(2) Gas undertaking A was manufacturing a straight coal gas of 480 B.Th.U; this being also the declared value of the town supply. It would therefore not have been possible to introduce 23 p.ct. of low-grade gas without the medium of a high calorific gas of 750 B.Th.U.

(3) The cheapest low-grade gas need not necessarily have been water gas, but gas produced either by complete gasification or other systems, which claim to manufacture gas at about 3d. per therm; the object being to bring into the supply the cheapest gas obtainable.

On this supposition 23 p.ct. of low-grade gas at 3d. per therm could have been introduced into the town supply of gas undertaking A, utilizing low-temperature gas of 750 B.Th.U. (valued at 4d. per therm by the Fuel Research Board) and purchaseable at 6d. per therm, thus bringing down the average price as follows:

	d.
60 p.ct. coal gas, 490 B.Th.U., at 8d. per therm . . .	= 4·80
14 p.ct. low-grade gas, 300 B.Th.U., at 3d. per therm. .	= 0·42
26 p.ct. low-temperature gas, 750 B.Th.U., at 6d. per therm	= 1·56
490 B.Th.U. town gas	6·78

Saving 1·22d. per therm.

Charging the low-temperature gas at 10·7d. per therm would have resulted in bringing the average price up to the original figure of 8d.

If it is possible to extend our methods and to bring into gas-works practice the large yields of low-grade gas obtainable by complete gasification or other means, it is worth investigation, both from the consumers' and the suppliers' point of view.

A town supply of 490 B.Th.U. declared value produced by an admixture of these two systems would result as follows:

	d.
64·7 p.ct. of low-temperature gas, 750 B.Th.U., at 6d. .	= 3·88
35·3 p.ct. of low-grade gas, 300 B.Th.U., at 3d. . . .	= 1·06
Cost per therm	= 4·94

W. CHANEY.

5, *Victoria Street, Westminster, S.W.* 1,
Dec. 3, 1922.

Education of Gas Engineers.

SIR,—During the discussion at Manchester on Nov. 28 of the Institution's Education scheme, I raised the position of the young gas engineers trained in the works of gas engineering contractors. I could find no provision for them. Many gas engineers are in the habit of sending their sons to such firms as West's, Dempster's, Drake's, &c., or purely engineering works for training in engineering before entering a gas-works. Such young men have been welcomed by the heads of undertakings as the right ones for junior assistants; and many have risen through the ranks to the highest positions, and are occupying the same to-day, with credit to themselves and to the industry.

It will be a bad day for the industry when the supply of such men is finally cut off, as is quite certain under the scheme as laid down; for no one would send his son to an engineering firm if, after serving his five years or longer, he had to serve an equal period in a gas-works before he could obtain his "higher certificate" in manufacture or supply, or both, and wait a further period for his diploma. It is quite true that the Advisory Committee have power to vary the term of "practical" work in a gas-works in "special cases." This does not, however, meet the case, as Mr. Hole, in replying to the discussion, rather heatedly stated that "the scheme was for gas-works men, not contractor's men; and we did not want the latter." In private discussion he modified this somewhat. If this is the manner in which applications from young gas engineers trained by contractors will be sympathetically met, it is necessary that provision should be made in the scheme for such cases, and that they be treated not as "special cases."

131, *Derbyshire Lane, Stretford,* H. KENDRICK.
Dec. 1, 1922.

Increasing Vertical Retort Capacity.

SIR,—Your editorial on p. 488 of the "JOURNAL" for Nov. 22 is incorrect in describing the injection of air into the lower part of continuous vertical retorts as an aid to steaming as *a novelty*, the same having been in use and applied to all "Dempster-Toogood" installations since the war.

Tracings Nos. 20,227/9 and 20,589/5, dated respectively July 23, 1919, and Dec. 9, 1919, detailing this air injection, show conclusively when the idea was *really* novel.

Elland, Nov. 27, 1922. H. J. TOOGOOD.

Stretford Gas-Works.

SIR,—Your issue of Nov. 29 states that Mr. W. M. Carr has accepted the position of Engineer and Manager to the Stretford Gas Board. It is strange that his acceptance should be notified after an advertisement had appeared in the "Manchester Guardian" on Nov. 1, calling for replies by Nov. 21. Mr. Carr's appointment was made on Nov. 6.

I note also Mr. Carr's hopes of cheap gas at Stretford. I had very

considerable hopes also in the same direction, before I resigned, for the following reasons: Coal and slack prices were down, the value of good gas slack being about 15s. per ton against 30s. per ton last year. The coke market was stiffening owing to the operations of the Lancashire Commercial Section. Tar values had increased by over 25s. per ton. Ammonia is producing a substantial revenue, instead of a loss as in 1921. All commodities used, and wages, are falling. Upwards of £1100 was spent on special repairs this year, which will not be required in 1923.

It is evident, therefore, that a very considerable reduction in working costs must come about, whoever controls the works; but that they will be able to sell as cheaply as Manchester is another question, when it is remembered that interest, &c., charges will be about 8d. per 1000 c.ft. more than the old Company and in the City.

H. KENDRICK.

131, *Derbyshire Lane, Stretford,*
Dec. 1, 1922.

The Limitations of the Law of Inverse Squares.

SIR,—I am sorry to refer to the subject again, but must call your attention to the fact that my correction of the error in the article on "Limitations of the Law of Inverse Squares" was mis-handled in your publication of the letter last week. What I wrote was that A_1D should be A_1D^2 (*i.e.*, the *square* of the distance), not A_1D_2 as printed by you. The latter expression would be meaningless, as there is no such point as D_2 in the sketch referred to.

A. R. MYHILL.

1, *Daniels Road, Little Bromwich, Birmingham,*
Dec. 2, 1922.

[The necessity for this second correction is regretted. The error arose through the hasty supposition that a line, not the square of a distance, was designated. Would not $(A_1D)^2$ be more orthodox and less confusing?—ED. G J.]

REGISTER OF PATENTS.

Prepayment Meters.—Nos. 175,643 and 178,439.

LOUDIS and GYR, A. G., of Zug, Switzerland.

Of these two recent specifications relating to prepayment mechanism for gas and other meters, we reproduce in each case only the first of the claims. Full details and drawings are supplied by the patentees in the complete specifications.

No. 4611; Feb. 16, 1922. Convention date, Feb. 18, 1921.

This relates to coin-freed mechanism for prepayment meters in which the coin is inserted in a knob, and by pressing the knob inwards against the pressure of a spring and then turning it, the coin is brought into the coin receptacle of the apparatus, whereby, after a definite rotation of the knob, the prepayment switch mechanism is operated; characterized by at least one catch situated in the path of the handle and actuated by the coin as it commences to roll out of the coin slot.

No. 10,348; April 11, 1922. Convention date, April 12, 1921.

This relates to a prepayment meter for gas, water, electricity, or similar commodity in which, by actuating the coin receiving device, a spring controlling the switching on and off of the commodity is put in tension, characterized by the fact that a spindle, driven by the measuring element of the prepayment meter, moves axially in proportion to the value of the prepaid coins, there being a tripping mechanism controlled by the spindle keeping the spring in tension, and releasing it when the amount of commodity corresponding to the value of the prepaid coins has been consumed. This avoids a locking device for the prepaid coins, and permits the insertion of a large number of coins.

Atmospheric Burner Regulator.—No. 187,333.

AIRD, K., of Falkirk.

No. 19,435; July 19, 1921.

This invention relates to nozzles and regulators for atmospheric gas-burners in which the latter consists of a rod having grooves round its circumference, which are gradually increased in depth towards the end of the rod. This grooved portion moves through a hole in the nozzle of the gas burner, the rod also being screw-threaded and engaging a screw-threaded hole in the burner casing so that the rod can be moved backwards and forwards. Thereby the apertures formed by the inclined grooves are increased or diminished in size as required, so as to determine the size of gas jet issuing into the mixing chamber.

The object of the present invention is to obtain a better distribution of the gas at the nozzle and eliminate all noise. The grooves are widened out in depth and width starting (according to the invention) from the nozzle end of the tube, and the hole in which the grooved end of the tube works is made somewhat deep, so as to give a long portion of the grooves in contact with the wall.

The tube (which is for admitting atmospheric air to the centre of the nozzle, air being sucked into the circle of gas jets emanating from the holes) ensures the gas jets being in ring form for a considerable length, and materially assists the outer air in commingling with the gas in the chamber; ensuring a better combustible mixture, besides preventing noise.

Low-Temperature Coke.—No. 187,336.

ROBERTS, J., of Abertridwr.

No. 19,525; July 20, 1921.

The patentee points out that in the carbonization of coal at temperatures between 600° and 760° C. the chief difficulties encountered are due to (1) the expansion of the coal on heating; (2) the resistance to heat transmission offered by the mass of coal on account of its low conductivity and the highly porous nature of the coke produced in the early stages; and (3) the friability of the coke or semi-coke produced. The expansion of coal on heating is due to the presence in it of an excess amount of binding material—that is to say, more than is sufficient to bind the particles of coal when fusion occurs. In the process of carbonizing coal the first stage is the fusion of certain constituents of the coal. If the coal contains excess binding material, the next stage is the decomposition of this excess accompanied by the development of a highly cellular zone, the formation of which causes the mass undergoing carbonization to expand. The highly cellular zone offers considerable resistance to heat transmission; and if carbonization is not carried out at a sufficiently high temperature to cause secondary contraction in the coke or semi-coke, the highly porous coke is very friable and yields a considerable amount of fine coke or coke breeze during transport.

According to the invention, the expansion of coal on heating it at temperatures between 600° and 760° C. can be avoided or minimized by previously adding (to the caking coal) sufficient non-caking coal containing 20 to 45 p.ct. of volatile matter. A proportion of coke breeze may also be added. As a result, on carbonizing the mixture at a temperature between 600° and 760° C. the excess of binding material is taken up, and a low-temperature coke with bright, hard, and dense outer layers is obtained.

Gas-Meter Measuring Chambers.—No. 187,368.

STANIFORTH, H., of Harrow-on-the-Hill.

No. 21,293; Aug. 10, 1921.

This invention relates to gas-meters having measuring chambers which comprise a dished plate with an annular groove, a disc diaphragm of leather or the like, and a locking wire which is adapted to fasten the diaphragm in the groove of the dished plate; the wire being without screw devices or spring loops for enabling its size to be varied.

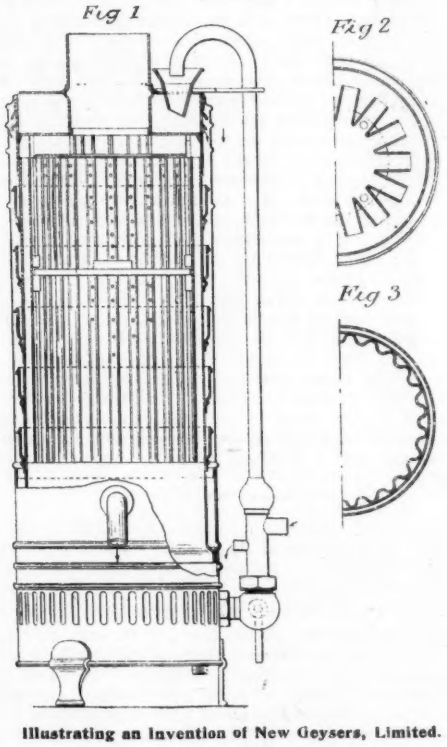
Hitherto in meters of this type the annular groove has been disposed at the extreme edge of the dished plate; but according to this invention it is disposed a small distance from the extreme edge of the dished plate, and the edge of the latter is made slightly conical so that it is momentarily distorted on forcing the locking wire into the groove.

Geyser Construction.—No. 187,674.

BARRALET, J. H., and NEW GEYSERS, LIMITED, both of Tabernacle Street, E.C. 2.

No. 19,264; July 16, 1921.

This invention, for improvements in the construction of geysers, has for its object to simplify the construction, reduce the cost of manufacture, and obtain increased efficiency. Accordingly gills or heat conductors and water and other channels are joined to the wall of the heating chamber or other surface by applying solder through apertures formed at the line of contact of the parts.



Illustrating an Invention of New Geysers, Limited.

In a form of geyser constructed according to this invention, a heating chamber is provided on one side with fins, gills, or hollow ribs for the rapid absorption of heat from the hot gases of combustion; while the other side, down which the water flows, is provided with a series of superposed overflow troughs adopted to retain water against the heating surface and to distribute the same evenly over the heating surface. Baffling means are provided for checking the escape of heat from the top of the heating chamber.

The heating chamber may be built up of several superposed units

each consisting of a section of the gilled wall and an overflow trough or troughs; and the exterior jacket is made loose and slightly larger in diameter than the outer cover of the geyser, so that the case can be lifted up for inspection of the water channels without disconnecting the vent pipe.

Fig. 1 is an elevation, partly in section, of a geyser constructed according to the invention; and figs. 2 and 3 partial sectional plan views taken on the lines 2—2 and 3—3 respectively of fig. 1.

Charging and Discharging Retorts.—No. 188,036.

ALDRIDGE, J. G. W., of Victoria Street, S.W. 1.

No. 20,055; July 26, 1921; and No. 25,182, Sept. 22, 1921.

This invention relates to improvements in the well-known Fiddes-Aldridge apparatus for charging and discharging gas retorts.

In this machine the hinged sections or lengths forming the centre bar are usually each built-up of two side plates fixed together with distance strips between them at the top and bottom edges; and it has been found that coal dust and similar material is liable to get into the interior of the sections and to prevent the free action of the hinge joints between the sections. One object of the invention is to obviate this, and another object is to effect improvements which will enable an increased charge to be deposited in the retort. These improvements include the construction of the hinged sections forming the centre bar with self-clearing hinge joints, the provision of means for lubricating the hinge joints, and the curving of the front push-plate to conform with the curvature of the crown of the retort, and providing a hinged leg thereon. The improvements also include the provision of twin stop-plates for preventing the coal deposited in the retort from being drawn back and out of the retort during the return stroke, by the action of the push-plate and central member with which they are connected.

Of the accompanying four sheets of illustrative drawings, we reproduce a side elevation (fig. 1) of part of a jointed charging apparatus constructed according to this invention, showing the front and rear end portions only of the charger proper; a plan (fig. 2) on a larger scale of one of the joints or hinges connecting the sections or lengths of a jointed centre bar; and a side elevation (fig. 3), partly in section, showing conventionally at the mouth of a retort the rear portion of the charger and part of its driving wheel, together with the sliding trough or apron plate and the stop-plates with the operating mechanism.

In the apparatus illustrated, a hinge-jointed central bar, formed of sections A adapted to be wound on and run off a polygonal wheel (in known manner), carries push-plates B, B^1, which are hung from swing pins or brackets C fixed in transverse holes in the central bar by grub screws C^1. The front push-plate B^1 is curved in order that when raised on the return stroke it conforms more or less to the curvature of the crown of the retort, and can thus rise close to the crown to provide the maximum clearance for the deposited coal. A leg B^2 is hinged to the front push-plate B^1, and during the forward stroke of the apparatus is housed in a space provided by cutting away a portion of the central bar. The leg B^2 thus keeps in a horizontal position during the forward stroke, and moves with the central bar along the bottom of the retort through the mouthpiece, then drops down free. On the return stroke the front push-plate is automatically raised to the horizontal, and maintained in that position by the leg, so that it passes over the top and clear of the coal. The other push-plates B are made with renewable side pieces set at a slight angle, but may each be in one piece if desired.

The different sections or lengths A forming the centre bar or support for the push-plates B, B^1, are hingedly connected together at their abutting ends by pairs of hinge plates or lugs D, which are applied outside the sections and extend across or overlap the joint between adjacent sections; the plates being fixed to one section by rivets, as shown, and pivoted to the adjacent section. Driving blocks D^1, for engagement with the polygonal wheel, are also fixed to the sections near the joints. Suitable filling pieces may be applied in the ends of the sections at the joints, to strengthen the sections and prevent the entry of coal dust between the side plates of the sections. With this form of construction the hinges clear themselves at each operation, and there is no possibility of compressing coal dust into the ends of the sections through the joint.

The hinge pins E, for connecting the separate lengths A of the central bar of the apparatus, are shown bored to provide a receptacle and passage for lubricant, in which a plug E, of metal, is used at one end with a small hole for a key employed to extract the plug when a further supply of grease is necessary. A second screw plug F may be inserted at the other end of the passage for use in the event of the passage being stopped-up at the opposite end, and facilitates the clearing of the passage.

A sliding trough or apron plate G is so arranged as to be in perfect alignment with the retort mouthpiece, enabling the floor to be level or flush with the bottom of the mouthpiece, and supporting the end of the apron plate. The latter is free to move within certain limits either horizontally or vertically, and is fitted with three taper guides (not shown); and when these come into contact with the outside of the mouthpiece, the sliding trough is automatically directed into its correct position and the machine is ready for charging with coal.

In order to prevent the withdrawal of coal when the central bar is being withdrawn, two similar plates H are fitted on either side of the central bar and work as one. They are secured on the ends of telescopic rods I, adapted to be held in the forward or operative position by locking arms J, capable of being depressed and disengaged by a lever arm K, operated from the polygonal wheel (or otherwise) and raised into engagement by a counter-weighted arm M. In the extended or retracted position of the stop-plate rods, the push-plates B can slide over them and over the stop plates. At the end of the charging stroke the stop-plate H may be carried forward automatically through the trough by a pin N on the central bar, whereupon the locking arms J engage the forward sections of the rods and retain the stop-plates in position until all the push-plates are again withdrawn, after which the arms J are lowered automatically and the stop-plates H are withdrawn into the machine by any suitable means.

Gas-Fire Secondary Heating Chambers.—No. 187,807.

GARRATT, W. J., and LEE, R. C., both of Birmingham.

No. 25,630; Sept. 28, 1921.

This invention relates to improvements in gas-fires of the type in which a secondary heat-radiating chamber is interposed between the fire and the flue, for the purpose of further utilizing the heat in the waste-products.

The secondary chamber, according to the invention, consists of a

Fig. 1.

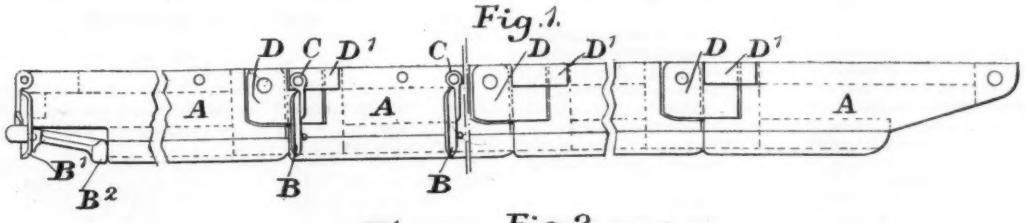


Fig. 2.

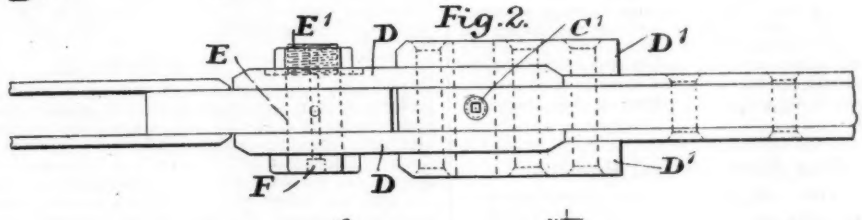
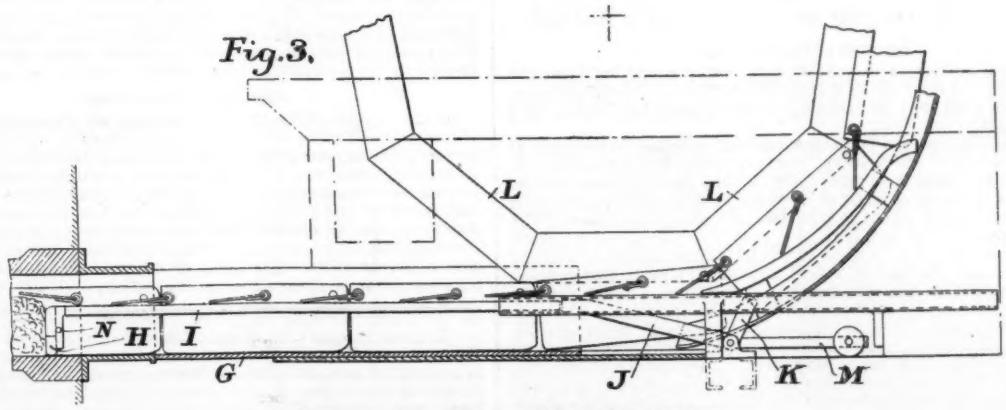


Fig. 3.



Improvements in a well-known Retort-House Machine.

sheet-metal box disposed behind the fire and canopy, and preferably higher than the latter. A compartment is formed in it, just below the inlet, by a perforated baffle-plate; while just below the latter is situated the outlet to the flue.

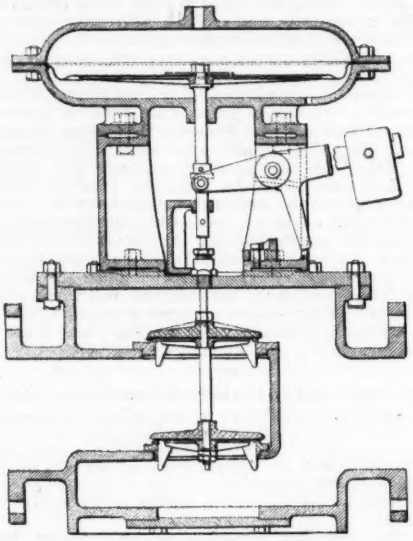
The heated air and products entering the upper part of the chamber are temporarily trapped; the air mainly ascending into the upper portion, and the heavier fumes descending through the baffle and finding their way to the chimney. The whole chamber may suitably be rectangular, and so accommodate utensils on its warm, shelf-like top.

Valves of Diaphragm Regulators.—No. 187,842.

Peebles, W. C., of Bonnington.

No. 28,280; Oct. 25, 1921.

The invention relates to apparatus for regulating the volume of flow or the pressure of fluids, of the type in which the valves controlling the flow of the fluid through a valve box are carried by a spindle connected at its upper end to a diaphragm extending midway across a chamber; the lower portion of the chamber beneath the diaphragm being open to atmospheric pressure, and the portion above the diaphragm to the outlet pressure from the valve box. The pressure at which the diaphragm regulator will act to tend to close the valves is determined by means of an adjustably weighted lever acting on the spindle carrying the valves; and the invention has for its object to ensure automatically that the valves will close on their seats should the controlling diaphragm become ruptured or damaged.



Peebles' Valve Closure Device for Diaphragm Regulators.

According to the invention, the regulating lever determining the position of the diaphragm (according to the predetermined pressure which is to be on the outlet side of the valve box) is carried on a fulcrum pin, rollers on the ends of which bear on curved ledges in a slotted bracket through which the lever projects (see drawing). One end of this lever has on it the usual weight adjustable in position, and the other end is forked and carries inwardly projecting pins bearing on a collar on the valve spindle. On the lever is a depending heel, and in the slotted bracket an adjustable tappet.

In the event of the diaphragm becoming damaged in any way, the valves will first rise above their highest normal working position. During this movement the depending heel on the lever encounters the adjustable tappet; and this causes the fulcrum pin to travel backwards on the supporting curved ledges until the forked end of the lever is withdrawn from contact with the spindle. The lever is thus thrown out of action, and the valves are free to close down on their seats and stop further flow of fluid.

Extracting Coke from Vertical Retorts. No. 187,911.

Dempster, R. & J., Ltd., and Rodger, W. F., both of Manchester.

No. 7087; March 10, 1922.

This invention relates to coke extractors of the type involving the use of a device in the form of a helix, whereby either intermittently or continuously coke may be gradually removed from the interior of a vertical retort.

Such a device, says the patentees, has been proposed in the form of a shaft about which are provided blades, or more than one helix commencing at the same level; and the peripheral parts of these helices extend close to the inner walls of the retort or chamber containing the device. Mechanical means is provided for rotating the same. The object of the present invention is to provide a device of a helical character, but in which, in place of blades of the character referred to, members are provided in helical form about a shaft, commencing at the same level, so that coke being extracted from a retort thereby falls bodily certain vertical distances during the operation.

A number of rods, bars, or members are employed, which are not attached to each other, but follow the curve of a helix when mounted to project from the shaft supporting them. They may be of any suitable cross section; even continuous blades, when employed, may have a section which provides surfaces in step form. In either of the above cases, it will be understood that as the shaft or blade or like holder rotates, the coke or material above each bar or step will fall vertically a given distance as the bar or step immediately beneath is removed by rotation.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 29.]

Nos. 31,617 to 32,319.

Alder & Mackay, Ltd.—"Coin-freed prepayment, &c., mechanism." No. 31,838.
Bacon, J.—"Means for controlling supply of gas to burners." No. 32,303.
Barker, W. H.—"Conveyors and screens for coal, &c." No. 32,151.
Berrisford, W. H.—See Barker, W. H. No. 32,151.
Chamberlayne, A. F. (legal representative of Glover, T.).—See Alder & Mackay, Ltd. No. 31,838.
Crowther, G.—"Wet gas-meters, &c." No. 32,259.
Curwen, D. R.—"Gas-irons." No. 31,937.
Davidson, W. B.—"Gas purification." No. 32,317.
Eyquem, M.—"Gas heating apparatus." No. 31,987.
Freeman, E. H.—"Electrically operated flow-meters." No. 31,792.
Glover, T.—See Alder & Mackay, Ltd. No. 31,838.
Grant, R. W.—"Gas-compressors." No. 31,905.
Haller, J. G.—"Utilization of waste gases from furnaces." No. 31,940.
Johnston, W. A.—"High-pressure reducing valve." No. 31,983.
Knowles, A. E.—See Grant, R. W. No. 31,905.
Koppers, H.—"Apparatus for degasifying or distilling gas from non-coking bituminous materials at low temperatures." No. 31,962.
Laing, B.—"Rotary retorts, kilns, &c." No. 31,807.
Lansdown, M. J.—"Gas cooking-apparatus." No. 31,639.
Liverpool Gas Company.—See Crowther, G. No. 32,259.
M'Laren, G.—See Haller, J. G. No. 31,940.
New Geysers, Ltd.—See Bacon, J. No. 32,303.
Nicholson, T.—"Neutralizing ammonium sulphate." No. 32,134.
Nielsen, H.—See Laing, B. No. 31,807.
Radiation, Ltd.—"Automatic gas-valves." No. 32,297.
Ride, J. A., and Ride & Bell, Ltd.—"Doors for retort mouthpieces, &c." No. 31,870.
Scott, Ltd., J.—"Apparatus for determining volumetric proportion of gases in mixtures." No. 32,136.
Simpson, S.—"Dry gas-meters." No. 31,959.
Snow, H.—"Gas-burner for lighting fires." No. 31,867.
Sonsthagen, A.—"Device for increasing heating effect of gas-fires." No. 31,764
Sugg, P. H., and Sugg & Co., Ltd., W.—"Means for controlling supply of gas to geyser, &c." No. 32,292.
Twigg, W. R.—See Radiation, Ltd. No. 32,297.
Vivian, A. W. H.—"Treatment of tar, &c." No. 32,174.
Wilge, L. K.—"Burner-nipple extractor." No. 31,820.
Woodroffe, F. K.—See Scott, Ltd., J. No. 32,136.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Gas Charges Inquiry.

Mr. Jephcott asked the President of the Board of Trade if he had received representations as to the desirability of an inquiry into the recent change in the method of charging for gas; and what action he proposed to take in the matter.

Sir P. Lloyd-Greame replied that a number of representations had been made to him, and he had appointed a Departmental Committee to inquire into the method of charging for gas on a thermal basis. The Committee consisted of Sir Clarendon Hyde (Chairman), Mr. Arthur Balfour, Sir James Martin, Mr. A. A. Pugh, and Mr. W. J. U. Woolcock.

Gas Regulation Act.

On Friday last, it was moved, and agreed to, in both Houses that the draft Special Orders proposed to be made by the Board of Trade under section 10 of the Act, on the application of the following gas undertakings, should be approved: Ashton-in-Makerfield Urban District Council, Haslemere and District Gas Company, County Borough of Smethwick, and the York Town and Blackwater Gas Company.

A copy was presented of a draft of a Special Order proposed to be made by the Board of Trade on the application of the Harrow and Stanmore Gas Company; also a Treasury Minute directing that the Gas Fund accounts of the Board of Trade under the Act shall be audited by the Comptroller and Auditor-General.

Provisional Order Fees.

On the motion of Mr. Hope (Chairman of Ways and Means), the House assented to an amendment of the Standing Orders relating to private business, providing that on the second reading of a Provisional Order Bill, other than a Bill to confirm an Order under the Private Legislation Procedure (Scotland) Act, 1899, the applicants for each Provisional Order included in the Bill shall be charged a fee of £15; and that for proceedings before the Court of Referees or any Committee the same fees shall be charged to applicants and opponents as in the case of Private Bills. The result of this amendment will be to produce a revenue of about £1000 in the session.

In connection with the distribution of the dyestuffs which are being obtained from Germany as reparation, a list of the products comprised in the stocks now available has been prepared, and may now be obtained on application to the British Dyestuffs Corporation, Ltd., Reparation Department, No. 70, Spring Gardens, Manchester.

LEGAL INTELLIGENCE.

EDINBURGH GAS-WORKS INCOME-TAX.

Judgment has been delivered in the Second Division of the Scottish Law Courts in a special case in which the parties were the Corporation of Edinburgh and the Lord Advocate, as representing the Disposal and Liquidation Commission.

The Minister of Munitions on May 16, 1916, entered into an agreement with the Edinburgh and Leith Corporations Gas Commissioners, to whom the Corporation have now succeeded, by which arrangements were made to scrub the 10 million c.ft. daily output of the Corporations' gas-works for the recovery of benzole, toluole, xylol, and other contents, as might be required by the Government. The Government were to erect at their own expense, on a site provided by the Corporation, suitable plant, with which was to be incorporated any plant or machinery belonging to the Corporation which might be used. The Government were to pay a nominal rent for the site of £1 per annum, and in any event were to pay or indemnify the Corporation against "all rates, taxes, and assessments payable in respect of the said plant." The Corporation supplied plant and buildings of an agreed-on value of £12,191, on which value the Government paid interest of 5 p.ct., calculated from June 30, 1915. For the purposes of local taxation, the Corporation's whole undertaking is valued as a *unam quid* on the basis of net revenue. The Government have paid or indemnified the Corporation against local rates in the proportion which the 5 p.ct. bears to the net revenue of the undertaking; but a dispute arose between the parties in regard to property and income tax. For the years 1917-18 and 1918-19 the Corporation were charged income-tax on their whole undertaking under Schedule A. In later periods the charge of income-tax in respect of £609 11s. 6d. (the 5 p.ct.) has been made upon a separate return under Schedule D. The Corporation argued that the Government were bound under the agreement to pay income-tax upon the annual interest payment of £609 11s. 6d., while the Lord Advocate contended that the income-tax in respect of these payments was not a rate, tax, or assessment payable in respect of the plant in question.

The Division by a majority held that the Government were not bound during the currency of the agreement of May 16, 1916, to pay or indemnify the Corporation against income-tax, whether charged under Schedule A or Schedule D, on the annual payment of interest. The Government were found entitled to expenses.

A Service Complication.

A complication arising out of joint occupation of premises was disclosed in a case at Redcar, when William Murray was summoned in respect of £2 8s. 8d. for gas supplied during the quarter ended September, 1921. Defendant held that he had not used the gas, and explained that the place was a house and shop. The purchaser had taken possession of the shop, the defendant remaining in the house. It was agreed to separate the gas connections, and have distinctive meters; and this work was done by Corporation men. The Superintendent of the gas-works, in evidence, said the owner (in the shop) had since had several lights connected with the pipe served from defendant's meter; and the position had been explained by him (the Superintendent) to both parties. The Magistrates decided that the defendant must be held responsible for payment to the Corporation; and an order for payment was made.

Extending the Objects of Vickers, Ltd.

On Tuesday, Nov. 21, in the High Court of Justice, Chancery Division, the petition of Messrs. Vickers, Ltd., to extend the objects of the Company in accordance with a special resolution passed and confirmed at extraordinary general meetings, was heard before Mr. Justice P. O. Lawrence. Among the reasons which led Messrs. Vickers to make this application for the extension of their powers was the fact that, though the objects of the Company were extended in 1918 to enable them to use in post-war trade the buildings and plant acquired during the war for national purposes, it was not then known in detail what use it might be possible to make of some of these assets. The powers then granted to the Company have been considerably extended by these Court proceedings, when Mr. Justice Lawrence made the usual Order confirming the resolutions extending the objects. The additional powers conferred upon the Company include the holding of interest in coal and iron mines, brickworks, quarries, &c.; the manufacture of all classes of optical and scientific apparatus; the construction of electricity and gas works, smelting works, &c., aerodromes; and the carrying-out of research work. As a result of the granting of these additional powers, Messrs. Vickers are enabled fully to develop the great resources of the Company.

Clergyman Charged with Stealing Gas.

At Aldershot Police Court, the Rev. D. B. James, of Tredenham House, Farnborough, did not appear to answer two summonses charging him with stealing gas and unlawfully causing a pipe to be laid for conveying gas. George Rowe, employed as a handyman by Mr. James, was charged jointly with him in the second summons. It was stated on his behalf that Mr. James had been called away on an important engagement; and the Magistrates granted a warrant for his arrest. At the further hearing last Monday, defendant was present, and was committed to the Winchester Assizes for trial, bail being fixed at £100. Rowe was originally charged with laying the pipe to convey the gas belonging to the Aldershot Gas, &c., Company; but at the request of the prosecution the charge was withdrawn, and he gave evidence against the accused. Witness said he was in the employ of Mr. James; and after the gas was cut off by the Company his employer said to him "What about this gas, George? Can we do nothing with it?" Witness replied "Yes, I think we can." Accused said, "Shall we go and have a look and see what we can do?" Witness suggested that if they put a pipe to connect-up the disconnected pipe, it would give them enough light for the doctor who was attending a boy in the school, who had broken his collar-bone. They used a motor tyre tube for the purpose, which was taken off during the daytime. He and the accused laid the pipe together. Inspector Thomas, of the Gas Company, said that he saw two rooms lit-up in defendant's school, and Police-Sergeant Hobbs knocked at the door for some considerable time. After the lights had disappeared, defendant came to a bedroom window and said that he was not coming down for anybody. Hobbs drew attention to the fact that gas had been burning in the house, to which Mr. James replied: "There is no gas here. It has been cut off."

Non-Statutory Undertakings.

At North Lonsdale Petty Sessions, Ulverston, Wilfred Quirk, of Dale Terrace, Dalton, was charged by the Dalton Gas Committee with unlawfully attaching a flexible tube to a service main which had been placed in his house, but not connected with a meter. The prosecution was under the Gas-Works Clauses Act, 1847; and the defence was that the Dalton Gas Committee could not be undertakers under this Act, as they had no statutory powers. The case was therefore dismissed on the point of law.

MISCELLANEOUS NEWS.

GAS REGULATION ACT ORDERS.

There have been forwarded by the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Hartlepool Gas and Water Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 13·8d. per therm. (Nov. 29)

Radcliffe and Little Lever Joint Gas Board.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18d. per therm.

Prepayment meter clauses are included. (Nov. 23.)

Rhondda Urban District Council.

After the declared date: (i) The maximum price in respect of gas supplied by the undertakers shall be 19·2d. per therm; and this price shall be substituted for the price of 6s. per 1000 c.ft. mentioned in section 5 (limiting the price of gas) of the Ystrad Gas and Water Company's Gas Act, 1874. (ii) The price of 20·8d. per therm shall be substituted for the price of 6s. 8d. per 1000 c.ft. mentioned in section 5 of the Act. (Nov. 24.)

Shelley and Shepley Gas Light Company, Ltd.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 14·2d. per therm. (Nov. 23)

Shirebrook and District Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 16d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (Nov. 28.)

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

Bridgend Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

DECLARATIONS OF CALORIFIC POWER.

Hessle Gas Company—450 B.Th.U. (March 21, 1923)

Middlewich Gas Light and Coke Company, Ltd—475 B.Th.U. (Dec. 31.)

Cheaper Gas at Llandudno.—There was some discussion on the gas question in the Llandudno Urban Council recently, when the Gas Committee recommended that the price be reduced from 6s. 6d. to 6s. per 1000 c.ft., as from Oct. 1 last, and an allowance of 5 p.ct. made for prompt payment. Mr. Humphreys moved that a discount of 2½ p.ct. be given to the slot consumers; and Mr. Cheetham, in support, said the slot-meter users were hit all the time by the extra cost of gas. Mr. Roberts suggested that the matter might be taken back for the Committee's further consideration. Mr. Wm. Thomas (the Chairman of the Gas Committee) said that all over the country slot-meter charges were higher than for the ordinary meter. Last year the price of gas was increased; but they could not alter the slot meters. They therefore had an advantage over the ordinary meter users, so a reduction was due to the latter. The Committee were entitled to congratulation on making a reduction. The loan charges in 1920-21 amounted to £2839, and the price of gas was 6s. 6d. Now the charges amounted to £9260 (an increase of nearly £6000, due to the outlay at the works), yet they were able to reduce the price of gas. The recommendation was eventually carried; the amendment being defeated.

GAS PRICES IN FRANKFORT-ON-MAIN.

[An abbreviated translation of an article in a Frankfort paper.]

As in the case of tramway fares, gas prices are raised about once a fortnight, rendering it impossible for the head of a family to balance his budget. Even the most economical housewife requires 2 cub.m. of gas for heating and lighting daily, so that the new price of gas—*i.e.*, M. 52 per cub.m. (equivalent at the pre-war rate of exchange to £73 per 1000 c.ft.)—represents a monthly outlay of over M. 3000 (equivalent at the pre-war rate to £150). Consumers are asking the question whether it is absolutely necessary to raise the price from M. 36 to 52 per cub.m., and how much dearer gas is going to become.

The principal reason for the increased price is the rise in the cost of coal and wages, and in the cost of material. Experts affirm that the price of coal in September was too low, with the result that the mines showed a deficit; and this was taken into consideration when the coal prices were raised in October. The Union of Coal Suppliers have raised prices as from Nov. 1 to an extent which represents over M. 3500 per ton, and freights have increased by 50 p.ct., so that the total increase per ton of coal delivered at Frankfort is M. 4800.

By the decision of the Court of Arbitration of Oct. 25, miners' wages will be increased by an average of 50 p.ct. as from Nov. 1; and the prices of all materials—such as iron, wood, &c.—are about seven times higher than they were in July, which seriously affects the cost of coal production. If the price of gas were not increased from M. 36 to 52 per cub.m., the Frankfort Gas Company would show a monthly deficit of over one hundred million marks. It should be noticed that the increased price will only suffice to cover the additional expenditure, and that it is not intended to pay a higher dividend. It is also interesting to note that over 50 p.ct. of the sum collected from gas consumers returns to the Government in the form of coal and turnover tax.

It must not be thought that the inhabitants of Frankfort pay more for their gas than the inhabitants of any other town in Germany. In September, for instance, the price in Frankfort was M. 24 per cub.m., M. 25 at Chemnitz, M. 27 at Darmstadt, M. 26 at Hamburg and Worms, and M. 35 at Wiesbaden.

The Gas Company have recently placed a further two million marks—in addition to the million previously allotted—at the disposal of the Public Welfare Office. This office examines the question of the ability of consumers in needy circumstances to pay their gas bills, arranges for part payments, and in some cases settles the accounts entirely.

Since the above was written, a paragraph has appeared in the Berlin papers to the effect that the price of gas in Berlin is to be M. 90 per cub.m. in December.

CONTINENTAL UNION GAS COMPANY, LTD.

Annual Report.

At the meeting next Tuesday, the Directors will submit the audited statement of accounts for the financial year to June 30 last, together with the following report.

In presenting their report last year, the Directors anticipated a better outlook in the near future. This hope, unfortunately, has not been fully realized, owing to the continued delay in the readjustment of the general economic situation, not only in the countries of Europe, but throughout the whole world. The Directors are of opinion that, owing to the fair treatment by municipal councils in France, and the better prices for gas now obtainable, capital invested in gas undertakings in that country should again become revenue producing, thus enabling the Compagnie L'Union des Gaz, in which this Company is so largely interested, to resume the payment of dividends.

Coal is now being supplied in France at a lower cost. Coke stocks, which were heavy a year ago, are almost depleted, and the prices obtainable during this coming winter for all residuals should be substantially improved. The question of exchange has greatly preoccupied the Directors. The improvement manifested in the earlier months of this year has not been maintained; the French exchange, which chiefly concerns the Company, having seriously depreciated since June last. Owing to the unsettled economic situation, no reliable valuation can yet be made of the Company's large Continental holdings.

After deducting management expenses and pensions charges, sufficient provision having been made last year for income-tax and corporations profits tax, there remains a credit balance of £9871. It will be remembered that the larger dividend credit last year included the dividend in respect of the last pre-war year of the Compagnie L'Union des Gaz, which had been held in abeyance since 1915. The Directors have transferred £3000 of the credit balance to a reserve exchange account as a precautionary measure, leaving £6871 to be now dealt with. Out of this balance, the Directors recommend the payment of a dividend of 4 p.ct., less income-tax, on the preference stock—an increase of 1 p.ct. over the dividend paid a year ago. This will absorb £5700, leaving a balance of £1171 to be carried forward.

The Directors deeply regret to report the death, which occurred last January, of their valued colleague and vice-chairman, Sir Arthur Lucas, who had been associated with the Company since 1887. To fill the vacancy, they have nominated Sir James Farquharson Remnant, Bart., M.P., a Director of several important undertakings. The Directors retiring by rotation, in terms of the Articles of Association, are Colonel H. Le Roy-Lewis, C.B., C.M.G., D.S.O., and Sir Henry Birchenough, Bart., K.C.M.G., who, being eligible, offer themselves for re-election. The retiring Auditors, Mr. C. P. Crookenden, F.C.A., and Mr. G. A. Cave-Orme, offer themselves for re-appointment.

Seaford Gas Company's Reduction.—The Directors of the Seaford Gas Company announce that the price of gas will be reduced 6d. per 1000 c.ft. as from the date of the Christmas meter readings.

ASHTON-UNDER-LYNE GAS COMPANY.

Mr. Townsley Explains the Position.

An interesting story of the development of the gas industry, with particular reference to the Ashton-under-Lyne Gas Company, one of the earliest gas undertakings established in England, was told at a public meeting by Mr. JOSEPH TOWNSLEY, the Engineer and Manager. The Ashton Corporation are at present engaged in negotiations for the purchase of the works, which, though situated in the borough, are responsible for supplying several urban areas and some of the rural parishes in South-East Lancashire. The Ashton-under-Lyne Gas and Water Works Company was formed in 1825. Powers to supply water remained with the Company until 1845, but were never exercised.

Mr. Townsley traced the negotiations which led to the Government insisting that gas should be charged for by heating value, rather than by volume, and strongly resented any suggestion that the new method was a trick on the part of the gas companies to obtain more money. The Government insisted that the standard of heating should be the one to be established, and there was no choice in the matter. Gas companies were held down pretty tightly by legislation. They could not make dividends like ordinary industrial concerns. When the Ashton Company went to Parliament in 1877, the basic price of gas was fixed at 3s. 8d. per 1000 c.ft.; and so long as they sold gas at that price, they were allowed to pay 10 p.ct. dividend. As an inducement, however, to sell cheaper, the Government allowed an extra 1 p.ct. dividend for every 4d. they reduced the price below the basic figure. As time went on, the efficiency of the plant improved; but more than anything else, owing to the greater consumption the price was gradually reduced, until it got to 2s. 4d., at which figure the Company could then pay 14 p.ct. The latter statement he desired to qualify. They might think it was 14 p.ct., but it was never intended it should be. In the Ashton and most other Acts, there was an auction clause, which meant that any shares they had to offer must be put up for public auction. They themselves could not buy the shares privately. If the Company had any shares to offer, 28 days' notice of the fact had to be given to the Town Clerk of Ashton, the London Stock Exchange, and the Board of Trade. Fixing 10 p.ct. profit was no better than if it was 5 p.ct. Prior to 1914, people were quite content to give £200 for a 10 p.ct. £100 share. They were satisfied with a 5 p.ct. return; and this was the intention of the whole thing. The £100 premium for the 10 p.ct. £100 share was paid to the Company, and bore no interest. When 15 p.ct. dividend was paid by the Ashton Company, £300 was paid for a £100 share. As a matter of fact, the ratio was greater than this, because people were satisfied with less than 5 p.ct. They could take it from him that he knew of no one who was getting 14 p.ct.

As a result of the war, the conditions changed, and through no one's fault the cost of production increased so that it was necessary the price of gas should be advanced. This abnormal condition of affairs reduced dividends to as low as 2 and 2½ p.ct., while at the same time the Government were asking for loans at 5 p.ct. This was a serious blow to the gas undertakings; and the Government eventually passed the Gas Regulation Act. Under the new Act, which admitted that the old basic rate had been destroyed, gas companies had to make application to the Board of Trade, and justify an increase in the basic rate. He himself filled in 49 schedules. There was no hole-and-corner business about getting an increase. The Mayor of Ashton and other corporate representatives were present at the Board of Trade when he (Mr. Townsley) put the case of the Gas Company for an increase, which was readily granted. Under the Order the Company were permitted to charge 1s. 4d. per therm; the quality to be 500 B.Th.U., to which they had worked since 1917.

Many people thought that because prices were falling in other directions, there should have been a speedy reduction in the price of gas. The companies, however, had suffered throughout the war period, and it was not until last year that they obtained any redress. In addition to repairs, and so on, being held up through the high prices, the Ashton Company were badly hit by the munition works explosion in 1917, which caused over £30,000 worth of damage to gasholders and other plant. Though that explosion was no fault of the Gas Company, yet the Ministry of Munitions said the Company and the Government should bear the loss in equal proportions. The Company, however, did not do so, though it involved them in an outlay of some thousands of pounds. After the destruction of the holder, the Company had not more than two hours' supply of gas, so that if anything else had happened they would not have been able to light the district. Fortunately, the public did not know the difficulty. They went along quietly at the gas-works, and he was proud of the men then who carried on and by hard work solved the difficulty. In June last there was a repetition of the damage to the holder. One part had not been repaired, and that was the portion which collapsed during the summer. It was 47 years old, and had done its duty; but the Directors hoped it would have lasted a little longer. If it had not collapsed, they could have resheeted it at one quarter of what it would now cost—£5000. During the coal strike the Company sold £2000 worth of coal to the townspeople; but as the strike lasted longer than was expected, the Company ran short, and had to buy from America at £2 per ton more than they let the people have their stock for. Mr. Townsley said those were the principal reasons why the Ashton Company were not able to reduce the price of gas as quickly as they would have liked.

Southport and the "B.C.G.A." Conference.—The Southport Corporation Gas Department were represented at the recent Bristol conference of the British Commercial Gas Association by the Chairman of the Committee (Councillor Robert Wright), who, reporting upon the matter, says: "The interest in the papers was well maintained to the close of the proceedings; and the fact that such a large proportion of the gas supply contributes to the revenue for the magnificent operations of the Association, is a declaration of a great unanimity of competent opinion as to the value and potency of the work of the 'B.C.G.A.'." Mr. Wright has accepted an invitation to become a Vice-President of the Association.

ORIENTAL GAS COMPANY, LTD.

The Ordinary General Meeting of the Company was held last Wednesday, at Finsbury House, Blomfield Street, E.C.—Mr. H. D. ELLIS in the chair.

The SECRETARY (Mr. S. Rainer) read the notice convening the meeting, and the Auditors' certificate. The Directors' report and the statement of accounts for the year ended June 30 were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he would, as he usually did, draw attention to the more important figures. First of all, if the shareholders would refer to the credit side of the revenue account, they would see that the gas rental amounted to close upon £90,000. This, of course, was a very gratifying feature, and was remarked upon in the report. It had been accomplished by the sale of a considerably increased quantity of gas. As a matter of fact, the sales, as compared with the previous year, showed an increase of no less than 61 million c.ft.

EXCELLENT BUSINESS CONDITIONS.

The greater part of this additional amount of gas, he was pleased to say, had been taken by the private consumers. The Directors always regarded as being of great importance the increasing of business with private consumers; for in this way they spread the business over a larger basis. The demands for various purposes—some domestic, and others industrial—had been very striking indeed. The Company had fixed a large number of boilers, geysers, and cookers; and the demand was still going on, and he hoped would continue to do so. With regard to public lighting, there was also a great increase in that department. The public lamps, which now numbered 16,498, showed an increase of 726 over the preceding year, which was very satisfactory. They had just entered into a further agreement with the Government of India for the lighting of the Maidan. The old agreement was drawing to its termination; and the new one was for a further period of ten years. He was happy to say, too, it was at enhanced rates of remuneration. The Municipalities of Cossipore-Chitpore and Manicktolla had been in treaty with the Company for a considerable number of lamps—counted by hundreds. Some had already been erected; but their ultimate requirements would depend upon a very important matter—and that was what might be done by way of extension of the Calcutta boundaries, upon which a Committee was now sitting. If the Government granted the Corporation's desire to acquire the above two municipalities, it would practically convert all the Company's district into one large Municipality of Calcutta. The Corporation were also considering another point which might affect their interests, and they had been in communication with other public utility companies and concerns over there who recognized that their interests might be seriously affected. Application had been made to the Government for permission to watch the case and argue it. The Government had recognized the equity of this request; and it had been arranged that the Company should appear by Counsel.

NO INCREASE IN GAS PRICES.

He might say, in connection with the larger rental, that, as was noted in the report, this financial success had been achieved without any increase in the price of gas. It was nearly five years since the price was fixed at 5 rupees per 1000 c.ft.; and it remained so to this day, though the market price of coal had risen in that time by fully 200 p.ct., and in addition to this the cost of every other commodity which entered into their business had enormously appreciated. The cost of labour had also very largely increased. He thought the consumers would very readily recognize that in thus keeping the price of gas so low, the Company had been faithful to their standard principle—"Supply the best possible gas at the lowest possible price." The Directors would, of course, as in duty bound, carefully watch the position, and take such steps as might appear advisable. It was quite impossible that the old price could continue for ever, with coal at three times what it cost when that price was fixed. Then with regard to residual products, they exhibited a very gratifying increase. Coke had been their chief benefactor in this respect. The sales of coke for the past year showed an increase of 20 p.ct. in quantity over the previous year; and he was also pleased to say that the price displayed a very pleasant increase. The Company's coke was very highly esteemed out in Calcutta, and they had no difficulty whatever in disposing of it. There had not been such an increase in price in connection with tar, but the increase in quantity sold was 36 p.ct. No wonder their residual products made so good a showing in the accounts. As to sulphate of ammonia, he had nothing in particular to say at this point; but he would refer to it again later on. There was produced on the credit side of the account a total of £138,436, which was £16,833 more than the corresponding total for the previous year. On the other side of the revenue account, they saw first the formidable item of coals, purification, and wages. What he had said already about the increase in the price of coal would doubtless account for the very large increase under this head, which was no less than £20,798 over the previous year. He might tell them that there had been great difficulty in getting coal; and it had not only been deficient in quantity, but sometimes also in quality. Under these conditions, Mr. Snelgrove had been hard put to it to carry on; but he had surmounted all his difficulties, and had kept the retorts going. The deficient deliveries were stated by their contractors to have arisen from flooding of mines and from labour troubles. No doubt there was a certain amount of weight to be attached to this; but he did think the contractors might perhaps have done a little better for the Company. It had been necessary to buy outside the contracts, to make up deficient deliveries. However, they had recently concluded some very good contracts with a substantial firm owning some of the best coal, for a period of between three and four years; but, of course, they had had to give the current market price. The next important items referred to mains, services, meters, and fittings, and wear and tear of works. Taking them together, they showed a nice reduction upon the previous year's figures; but, as would be noted on coming to the balance-sheet, the Directors had relieved the revenue account to a certain extent by transferring £3000 from the renewals suspense account. Thus they were reaping the benefit of their economic policy of building up out of profits a fund to meet, at least in part, future calls for outlay in respect of renewal charges. This was a policy which a year ago their friend Mr. Mackay (whom he was happy to see present that day) was so good as to stamp with the *visa* of his approbation, which the Board valued. As to bad debts and allowances, he thought, with a rental of £90,000, it was very remarkable that these should be no more than £46 odd. It said a great deal for their collectors. General expenses always varied slightly, and were a little higher this time. Then he came to the novel item of exchange on the debtor side. This was referred to in the report. He might say it had averaged 1s. 3·91d. As would be noticed, exchange had cost them £212 10s. 3d., which they could very well afford to bear.

THE BALANCE-SHEET.

Turning to the balance-sheet, it would be seen that expenditure on capital account was up to £403,367. This included an outlay on account of the new holder, which was very nearly completed, of £40,944; and for the retort-house and sundries, of £1365. All this had been provided out of revenue. The paid-up capital stood at only £6 6s. 9½d. per ton of coal carbonized, which was a very favourable figure, and the lowest one they had ever got to. As the shareholders were aware, it had always been the policy of the Board to keep the capital down. Amounts due to the Company, and coal, products, and sundry stores only showed a small increase. The amount invested remained the same, but the Stock Exchange value at June 30 was £3830 more than at the previous June. So that these terribly depreciated investments had recovered a little, and he thought they were going up still further. On the other side of the balance-sheet, amounts due by the Company were slightly more. Loan from the bank £26,870 was a new item. If the Directors had not borrowed from their bankers, they would have had to raise capital, which would have been very bad policy. Once capital had been raised, one could not extinguish it, unless it was in terminable debentures; but the Company could always borrow more cheaply from their bankers than they could even from the shareholders. They reduced the loan as the rental came in, and when a little more money was wanted they increased it. The money was all going into the works and improving them, and so making it possible to meet the greatly extended demand from the public. With regard to the working of the year generally, he thought that it reflected the very greatest credit upon Mr. Snelgrove, their Manager, who had had to contend against great difficulties, and had gone through an extremely unhealthy season, which had obliged him to run away for a little fresh air in the north. He hoped the shareholders would pass a cordial vote of thanks to him and to his excellent staff, who backed him up well. Prominently among these, he wished to mention the name of Mr. Pearson, who was Mr. Snelgrove's Chief Assistant. Mr. Snelgrove had been over in this country on leave, and the Board had had the great advantage of constant discussions and deliberations with him, which were much more valuable than any amount of epistolary correspondence, that took weeks to get a question in and an answer back again. While Mr. Snelgrove was absent, Mr. Pearson had entire charge of the Company's business; and he was happy to say that he had discharged his duties with great ability, and to the complete satisfaction of the Directors. The purity of the gas supplied was an important matter to the Company because they were under rigorous regulations of the Municipality; and during the whole of the year they had never incurred any penalty whatever in connection with the quality or purity of the gas, which had been well maintained. They had, however, been troubled to some extent in the matter of purity by a deficiency in the public supply of water, which was, of course, necessary for the treatment of the gas. This supply had become so inadequate in quantity that the Municipality had issued a notification addressed to the public enjoining upon them the absolute necessity of observing the most stringent economy in the use of water for a period of years, until the deficiency could be remedied. But apart from the shortage, the temperature of the water was so high as to prejudice the Company's working in respect of purification; the ammonia being imperfectly separated from the gas (where it was harmful), and being at the same time lost to them as a valuable bye-product for sale, so that they were being doubly hit. Several big consumers of water proceeded to sink private wells of their own; and, after careful consideration, the Company had sunk one for themselves. Thus they would be independent of the Municipality, and would have no more hot water. Valuable results were anticipated from this operation.

CONDITIONS IN INDIA.

There was but one thing he would add. He had sometimes indulged at meetings of the Company in aspirations for the more speedy development of the natural resources of India, which should bring her almost within view, as it were, of being self-contained in respect of the production of most of her necessary commodities. The shareholders would probably all remember his references to this matter. But the labour unrest, and the generally unsettled condition of the people of India, had caused him to pause and consider what would be the effect upon the population. About 90 p.ct. of the people were agricultural, children of the soil, content to live and die on the land which they and their fathers for generations had tilled. Politics had no attraction for these; they wanted no votes. They only wished to be left alone in peace to provide their simple necessities of life. If these good agriculturists were taken from the land, and converted into mill and factory hands, they would probably be dead failures, and would deteriorate until they became degenerate undesirables and dangerous malcontents, susceptible to the poisonous blandishments of the Gandhi of the day. The mischief wrought to India would be simply incalculable. To his mind, this was a question which called for serious and statesmanlike consideration.

Mr. STANLEY H. JONES formally seconded the resolution.

Mr. PARKER said he rather gathered that the construction of the new gasholder and retort-house, sinking of the well, and various matters of that sort, were strictly speaking items of new capital expenditure, and not merely renewals. Could the Chairman give them an approximate idea of what the real capital expenditure would have amounted to by the time it was all finished?

The CHAIRMAN replied that the building of the large new holder was

very nearly completed, and it would have cost a little over £60,000. Renewals had already been carried out in the retort-house, and some were still due. When the new holder was finished, they would undertake the extension of another holder. This work, apart from the new holder, which of course is a capital item, would be practically all renewals, and would cost some £20,000. The well would cost about £600, and would be about 400 ft. deep.

Mr. PARKER: You have really been spending a good deal of money, which I gather is to some extent new capital.

The CHAIRMAN: A large portion of it has been debited to capital; but it has been a rule with this Company never to carry anything to capital which they can meet out of revenue. That strengthens the Company. The further renewals referred to will have to be paid out of future revenue.

Mr. PARKER said he was sure the shareholders would concur in the conservative policy of the Board, and recognize the benefits of it. He confessed he was just a little disappointed, on turning to the figures in the accounts, to find the Directors had not made any actual appropriations to any reserves during the year. In fact, they had taken £3000 from one of the funds. At the same time, the balance was only a very little more than the year before. He thought this arose from the very large debit for British income-tax, amounting to over £6000, or something like 2 p.ct. on the stock of the Company.

The SECRETARY pointed out that this included two years of the corporation tax, of which they had no figures available to put in the previous year's accounts.

Mr. PARKER: Generally speaking, I am sure the shareholders will be very satisfied with the accounts and the policy of the Board.

Mr. R. M. LONG: Is it necessary to keep that £27,000 in renewals suspense account?

The CHAIRMAN: We shall want it all.

Mr. LONG: Am I right in assuming you have paid a certain amount on account of these new works?

The CHAIRMAN: It is nearly all paid for.

Mr. LONG said the accounts did not distinguish between what was spent on capital and what was spent on repairs. The whole position, however, was very satisfactory.

Mr. J. H. MACKAY said reference had been made to the enlargement of the Calcutta Municipality, who were hoping to absorb some of the outlying boroughs. If this happened there might be some changes in the balance of parties. The object of the Board had always been to keep the capital of the Company as small as possible by doing a great deal of the necessary work out of revenue. It was well known that, though the capital was put down at £300,000, the concern was certainly worth £600,000.

The CHAIRMAN: The capital expended is the real figure. We have raised £300,000; but we have spent more out of revenue.

Mr. MACKAY: You make an allusion in the report to the floods. Were the works inundated?

The CHAIRMAN: We say no substantial damage was done to the works; but there have been floods over many parts of Bengal. I mentioned that our coal contractors complained that their output was reduced by the floods.

The resolution was then put to the meeting and passed unanimously.

THE DIVIDEND.

On the proposition of Mr. BASIL M. GILL, seconded by Mr. BERTRAM W. ELLIS, it was resolved—"That a dividend of 8 p.ct, less income-tax, be declared for the twelve months ended June 30, 1922, and that the same be paid to the proprietors on Nov. 30, less the amount paid on account."

RE-ELECTIONS.

Mr. S. H. JONES proposed the re-election of Mr. H. D. Ellis and Mr. H. H. Macleod as Directors of the Company. No words, he said, were needed to recommend these gentlemen to the shareholders. Their worthy Chairman had presided over the meetings for so long that his knowledge of the Company probably extended further back than that of anybody in the room. His wide experience of gas affairs, the unfailing attention and care he bestowed on the Company's business, and the dignity and courtesy with which he filled the chair, justified his re-election. Mr. Macleod, a most excellent colleague, brought to the aid of the Board a wide knowledge of Indian affairs—especially with regard to coal—which was most useful to the Company. He was a valuable Director.

Mr. GILL seconded the proposition, which was cordially agreed to.

Proposed by Mr. MACKAY, and seconded by Mr. B. W. ELLIS, the Auditors (Messrs. S. W. Savage and F. J. Bradfield) were re-appointed.

VOTES OF THANKS.

Mr. B. W. ELLIS next proposed a hearty vote of thanks to the staff in Calcutta and London. He said that the Chairman had already referred to Mr. Snelgrove's visit to this country, when he came over on leave. While here, he attended almost every meeting of the Board that was held. He explained the position of affairs in Calcutta in a way that a mail letter never could. During his absence, his place was taken by Mr. Pearson, who had had a great deal to contend against during the year. There had been considerable interruptions to the supply of coal, and the great growth of the business had put a severe strain on the Company's plant, which had been a source of anxiety to Mr. Pearson and Mr. Smith, the Works Manager; but they had exercised every care in the conduct of affairs out there, and the shareholders owed much to them. Mr. Bacon, the Mains Superintendent, was another excellent servant, and his work had been interfered with during the year by the floods. These were due to very heavy rainfall; and the city of Calcutta being practically dead flat, this flood water did not move away very quickly. However, the mains were absolutely undamaged, and this reflected great credit upon Mr. Bacon and his assistants. Mr. Morrison, the Meters and Fittings Superintendent, also did excellent work. When home on leave some time ago, he went over various works and studied all the improvements; and on his return to Calcutta, he placed the knowledge thus gained so successfully at the Company's service that the business had extended in the way which had just been explained to them. Excellent work was also done by Mr. Hayward (the Meter Foreman), Mr. Savage (the Chemist), and Mr. Garsed (the Accountant). Referring again to Mr. Snelgrove, the shareholders would be glad to hear that he had renewed his agreement with the Company. As to the London staff, Mr. Rainer, their old Secretary, had the history of the Company for the last thirty years at his fingers' end. His care and foresight were beyond all praise. He and his assistant, Mr. Hench, had during the last few years had a great deal of work thrown upon them by the Government regulations. Mr. Rainer had met the Inland Revenue Authorities frequently, and had put before them in a most successful manner all the arguments in favour of lightening the weight of taxation. All of them would wish this vote of thanks to the staff not to be an empty formality, but a warm expression of their appreciation of all that had been done for them.

Mr. MACLEOD seconded the proposal, which was cordially passed.

Mr. RAINER said it would give him great pleasure to convey the vote to India. It would help them all in their work to know that their labours were so thoroughly appreciated.

Mr. BRADFIELD, proposing a vote of thanks to the Chairman and Directors, said that, speaking as one of the Auditors, the financial operations met with his full approval.

Mr. PARKER seconded the vote, which was unanimously accorded, and briefly acknowledged by the CHAIRMAN.

GAS OR ELECTRICITY FOR HOUSING SCHEMES.

Discussion by the Exeter City Council.

Some points were raised at a meeting of the Exeter City Council regarding the supply of gas and electricity to the Council houses.

Mr. WIDGERY replied in the affirmative to a question whether it had been definitely settled not to instal electric lighting in the Buddlepane houses. He observed that it was not practical, because of the expense, which he had no doubt the Ministry of Health would not permit. If they had adopted the dearer method, it would have landed the tenants in an impossible position.

Miss SPLATT inquired whether Mr. Widgery could refer the Council to the minute of a Committee report showing that the Gas Company were given practically a monopoly for supplying gas to the Council houses. As a member of the two Committees, she knew nothing about it.

Mr. WIDGERY said the cost of installing electric lighting was such that he would refuse to ask the Council to sanction it. If they had electric lighting put in the houses, they would have no cooker or washer. Miss Splatt had said they would never have electricity, because so many of the members of the Council were shareholders in the Gas Company; but he wished to make it clear that this had nothing to do with it. The Committee made their decision on the question of cost, and the two vital points of the washer and cooker.

Miss SPLATT denied that she was responsible for the assertion. She moved that the relative cost of installation of gas and electricity be furnished, with a report to the Council.

Mr. VINCENT THOMPSON, seconding, asserted that the question had not been before the Committee of the Council. He understood that the Gas Company were under a statutory obligation to supply gas. Even if electricity were used for lighting, surely they could obtain gas for the cookers and washers.

Mr. WIDGERY said the question was entirely one of the cost of installation. The Gas Company's figures were £3 10s. per house, and for electric lighting from £4 4s. to about £5.

Mr. GAYTON said if it was correct that, should electricity be installed for lighting purposes, the Gas Company would refuse to supply gas for the cooker and washer, then the citizens ought to know it. The Council should find out what statutory powers they had, because it might mean placing citizens who used electric light at a serious disadvantage.

Mr. WIDGERY suggested the Council should remember that had it not been for the public-spirited manner in which the Gas Company came to the rescue at the Polsloe Bridge site, the lighting there would have involved the Council in a very large sum. It was not true to say that the Gas Company were holding a pistol at their heads.

The motion was carried by a large majority.

Mr. THOMPSON: I take it no contract will be entered into with the Gas Company, the question not having been before the Committees concerned?

Mr. WIDGERY: The whole thing has been before the Committees, and settled long ago.

An Old Gas-Works Closed.—Having arranged to supply the whole of their area from the headquarters works at Sowerby Bridge, the District Council of that town recently closed down the old gas-works at Luddendenfoot, which have been in operation for a long period, first under a private Company, and for many years past by the Council.

Calorific Power Question at Hull.—The Hull Corporation Water and Gas Committee decided at a recent meeting to press the British Gas Light Company to obtain an Order under the Gas Regulation Act, which will, at any rate, be the effect of their request to the Company to revert to the old standard of 500 B.Th.U. At the previous meeting, it was reported that the period during which this standard was waived had long since expired, and the Company had not intimated what they proposed to do under the new Act. The East Hull Gas Company had established the therm system, and it would be advantageous to the city to have both Companies operating on the same basis. The Town Clerk gave an account of an interview with the Company, the purport of which, he said, was a desire that the position should not be altered before next June, in order that the Company might consider the financial results of the last reduction in price. The Committee reaffirmed their decision requesting the Company to restore the 500 B.Th.U. standard, as the result of which the Company will apply for an Order.

ELECTRICITY AND GAS PROPAGANDA.

At a Meeting of the Institution of Electrical Engineers on Thursday last, a paper entitled "Domestic Load Building; a few Suggestions upon Propaganda Work" was read by Mr. W. A. GILLOTT. The object of the paper was, the author said, to show in a simple manner some of the channels open to electricity supply undertakings for securing the domestic load. As conditions varied in every district, the subject must be approached from a different angle in each case. In certain districts it might be fatal to adopt a too progressive attitude; and one must therefore lead up to the point by suggestion. In others, it might be found desirable to combine the development scheme, such as an educative campaign by actual demonstration, with Press and other advertisements.

These methods were briefly discussed and reference was made to the value of the domestic load to electrical undertakings, and the various proportions it can take. A skeleton scheme of one year's campaign was put forward; and in view of the decision of certain authorities to embark upon this development, the author expressed the hope that his remarks would prove of interest. The paper then discussed the fundamental essentials on the question of tariffs, load characteristics, hire of appliances, &c., and a chart showing one week's demand on a housing estate—the Billingham Housing Estate—which is supplied by the Newcastle-on-Tyne Electric Supply Company, was given.

While the paper was a statement dealing with the advantages of the all-electric idea to the electricity supply undertakings, the manufacturers of electrical apparatus, the wiring contractors and the users, and made no direct comparisons with gas, there were several references to gas in the discussion.

Mr. L. L. ROBINSON (Chief Electrical Engineer and Manager of the Hackney Borough Council Electricity Undertaking) said that the public had had so much of therms that its mind was tuned for the reception of the all-electric message; and he advised all central station engineers to seize the opportunity and start broadcasting as soon as possible. He was installing electric cookers in whole streets, and not one or two cookers here and there. It was possible to devise a tariff which would tempt people to become electrical "wholeboggers." He outlined a tariff for this purpose; one of the conditions being a limit of one gas-ring and one coal fire.

Mr. A. F. BERRY said the plan to proceed upon was to ascertain what it cost a householder for his gas, coal, and electricity per annum—few people realized how much it was—and then to demonstrate that it could be done much cheaper by doing it all electrically. He instanced a house where the total cost at present might be £75 per annum, and suggested that if, as was easily possible, it could be proved to the householder that by using electricity alone it could be done for £70 or £72 per annum, then the business could be obtained. It only needed the public to have the advantages of electricity brought to their notice for them to appreciate them, and he personally had actually been abused by a client for not having brought the matter to her notice before.

Mr. J. W. BEAUCHAMP (Director of the Electrical Development Association) said the position at present was that station engineers feared that the supply of electricity for domestic purposes at very cheap rates would not be a remunerative proposition; but there now existed figures which showed that it was a paying proposition. Once the supply station engineers were convinced of this, then they would begin to lay mains. He impressed on them the point that the curves of the load on the Billingham estate referred to 25 houses, and not one house. As further figures of this nature became available, they should be brought to the notice of supply engineers, and the domestic load would then make rapid headway.

Mr. W. R. RAWLINGS (an electrical contractor) complained that the supply authorities did not co-operate with the electrical contractors by giving them current for demonstration purposes and window displays at cheaper rates.

Mr. A. C. CRAMB (Chief Engineer and Manager of the Croydon Municipal Electricity Undertaking) said the development of the domestic load was handicapped by the action of the electrical contractors themselves. The Electrical Contractors' Association had obtained a parliamentary decision which prevented the majority of municipal undertakings from selling or hire-selling apparatus, and yet the contractors themselves were not going about the business in the manner they should, having got such a decision.

Mr. P. M. BAKER said it was still cheaper to cook by coal or gas than by electricity. [This remark was greeted by loud cries of "No, No."] Mr. Baker maintained that it was so, however, and suggested that it would be found very hard work to displace gas, from the smaller houses at any rate. They could place the therm question on one side in this matter, because this was put up by a certain newspaper as a "stunt" effort; and there was very little in it when it was sifted. He agreed that the domestic load was a most attractive one; but it required a lot of propaganda work to develop it.

Mr. YOUNG, an electrical contractor, said there was plenty of room for action in regard to this matter. It was necessary to look at the gas industry to see what it was doing, because, notwithstanding that a certain paper had talked about therms and rather ridiculed gas, there was still something for electrical people to put their backs into. The gas industry had some clever ways of keeping the business; and the electrical industry had got to find out how it was done and take action. He had had some personal experiences. For instance, there was a certain well-known surgeon who was changing his house, and during the past ten years he (the speaker) had installed electric fires in some of the rooms of the old house. When the surgeon moved, he told the speaker that he was not going to use electricity any more, but would be using gas. The fact was, said the surgeon, the gas company had always been very decent to him. They had seen that he had what he wanted, and had never charged him a lot for his gas; whereas the electrical supply companies had nearly ruined him. While the latter statement was not true, it meant that the gas company had been giving some service which the electrical people had not. The gas company's representative was always very active, and apparently he had been round and in some way given the surgeon some service in connection with the gas; and this was what the electrical people must bear in mind. The gas people were just now making a special effort to get the doctors, surgeons, and architects in their favour; and the time was favourable, so far as the latter were concerned, because people were now changing houses, whereas there had not been much of that done during the past eight years. It was only about a week ago that an architect rang him up and asked what he meant by advising one of his clients to put in electric heating. The fact was that the client was educated and the architect was not—or rather he had been educated by the gas company; and this was a matter which the electrical industry had to combat. Another selling point which the gas people made great use of was to tell the prospective consumer that the electrical salesman did not use his own electric cookers, and they said they could prove that a great many electrical men did not use electric cooking. This was a point which had to be overcome; and he had suggested to an enterprising firm of manufacturers that they should supply apparatus to members of staffs at a cheaper price in order that they would adopt electric cooking. The electrical contractors would be pleased to put in the installations at cost; and he suggested the supply authorities might put in the services in the same way, or even free.

Mr. GILLOTT, speaking on the question of gas propaganda, in his reply said that there was a great deal going on just now more or less behind closed doors. He could give instances, but had not the time then to discuss them in the manner he should like; but if they all knew what was happening on the part of the gas industry in their hope to retain the business, they would be surprised. He could not let Mr. Baker's statement go unchallenged. He denied emphatically that it was cheaper to cook by gas or coal than electricity, and could cite dozens of cases to prove this. For instance, in a ten-roomed house when he was in the North of England, he used electricity for lighting, heating, cooking, as well as a small amount of coal. His neighbour used gas for lighting, heating, and cooking, and coal. The charge for electricity was £3 10s. as a fixed charge, and ¾d. per unit. The gas was 2s. per 1000 c.ft. His own yearly cost was £32. He had one maid, who was always finished by 2 o'clock in the afternoon, and his house was clean. His neighbour's yearly cost was £65. He had two maids, who were never finished, and the house was dirty—they could not help it. Another instance was that of a doctor's house. The bill when gas, coal, and electricity were used was £98; but when everything was done electrically, this was reduced to £35.

GAS-FIRE LECTURE AT HULL.

Mr. Hamilton Davies, of Leeds, lately addressed a meeting at Hull on the subject of domestic heating, with special reference to the gas-fire. Members of the Master Plumbers' Association and their employees were present.

Mr. Harold E. Copp, the Engineer and Manager of the British Gas Light Company at Hull, presided, and expressed his gratification at the presence of so many. Nowadays, he said, it was usual to assume that gas was somewhat out of date—something which belonged to another generation. They were told they must have electricity if they were to keep up to date. This was a very great fallacy. He would say, specially to the younger men, that they were engaged in an industry which was very much alive, and which would continue to be so for many generations. As long as the amenities of civilization were what they were to-day, they would find gas and electricity. America was essentially electrical. Everything that could be done electrically was so done. He did not blame them; but what a splendid incentive it had been to the gas industry! If they knew the progress that the gas industry had made in America, they would be astonished. In New York it was with the greatest difficulty that the works could be kept of sufficient capacity to supply the demand. This fact spoke for itself. If he had to choose between going into the gas industry or the electrical industry, he would choose gas. Of course, the applications of electricity were infinite and interesting; but he maintained emphatically that the application of gas in the future would be equally interesting. It was a very scientific industry.

Mr. Hamilton Davies emphasized the importance of ventilation, and called attention to the obvious advantages of gas-fire heating from the point of view of cleanliness. From the hygienic point of view, the gas-fire had tremendous advantages over the coal-fire; and as to the cost, it could be proved that if they wanted a source of heat for an hour or two, the cost of gas was actually less than of coal. There was still a lot of misconception as to gas-fires, and those connected with the industry could do much useful propaganda work. If they had a sound knowledge of the appliances they were handling, the fitters would be in a position to instal gas fires to the best advantage. The manufacturers had devoted considerable time to making their appliances as suitable as possible for the public requirements; and with the co-operation of the trade in matters of correct installation and adjustment, the demand would be an increasing one. He was also absolutely certain that the age of gas was just beginning—certainly not closing.

The New Holder for the Blenheim (N.Z.) Corporation.—On p. 573 of last week's "JOURNAL" there appeared a paragraph headed "Gasholder Building in New Zealand," in which it was stated that a Wellington firm had secured the contract for the erection of a spiral-guided holder at Blenheim. The facts are that Messrs. William Coward & Co.'s principals, the Blenheim Borough Council, instructed them several months ago to enter into negotiations with British gasholder makers for the purchase of a suitable holder; and eventually Messrs. Coward, as their agents, placed an order with Messrs. C. & W. Walker, Ltd., of Donnington, for a two-lift spiral-guided holder having a capacity of 150,000 c ft.—dimensions inner lift 66 ft. by 22 ft. deep, and outer lift 68 ft. by 22 ft. deep—with eight spiral guides on the inner and ten on the outer lift. This holder was shipped some time ago; and the contract obtained by the Wellington firm mentioned last week was evidently for the erection work only, in the concrete tank prepared by the gas department.

MODERN GAS LIGHTING.

Second of Series of Lectures at Derby.

The second of a series of lectures on "Modern Gas Lighting" was given to some 200 members of the staff and employees of the Derby Gas Light and Coke Company at the Company's offices, on Thursday evening last. The lecturer was Mr. DEAN CHANDLER, of the South Metropolitan Gas Company, who dealt with the subject in a very interesting and comprehensive way.

Mr. J. Ferguson Bell (the General Manager and Engineer of the Gas Company) introduced the speaker, and went on to say that, happily for users of gas and electricity in Derby, the supply was in separate hands; so that there was wholesome competition, which would no doubt be to the benefit of both. He intimated that all consumers of gas could, if they desired, inspect the latest gas appliances at the Company's showrooms; and with a view to ensuring that the consumers obtained their supplies under the best conditions, he invited them to communicate with the Company from time to time. The lecturer's points on lighting were given with the idea of benefiting the public through the employees of the Company being thoroughly conversant with the most up-to-date systems. He impressed on the employees the necessity of getting customers to see that they obtained their gas supplies under the best conditions.

Mr. Chandler reviewed the history of gas at the outset of his lecture, touching on the various stages of its development since it was invented by William Murdoch about 1780. They were indebted to the German chemist, Karl Auer von Welsbach, for the great discovery of the incandescent system of lighting, which had made the use of gas perfectly hygienic. Dealing with the advantages attaching to the use of the incandescent system, the lecturer remarked that some of these were referred to by such eminent authorities as Dr. Leonard Hill and Dr. Rideal, who had made exhaustive inquiries into the conditions existing when gas and electricity were used as sources of light. Their conclusion was that in a room in which an incandescent gas-burner was used, a beneficial circulation of air was maintained, which produced just that requirement essential to the hygienic conditions of living. It was upon its power of setting air in motion that gas based a good deal of its hygienic superiority as an illuminant. Another matter of importance with regard to gas and electric lighting was, the lecturer contended, that the light from an incandescent gas-mantle was less harmful than that obtained from an electric lamp.

The lecturer was thanked on the proposition of Mr. J. Ferguson Bell; and Mr. H. Clark, the Superintendent of the Distribution Department, in seconding, remarked that it was proved beyond doubt that the South Metropolitan Gas Company had maintained their lighting load with a gas-burner which was constructed upon scientific principles; and he would be glad to see this very high efficiency burner extensively used in Derby.

CHEMICAL INDUSTRY CLUB DINNER.

The Fourth Annual Dinner of the Chemical Industry Club was held in the Connaught Rooms, London, on Friday, Nov. 24, when Mr. A. GORDON CRAIG (the Chairman of the Executive Committee) presided over an attendance of well over a hundred members and visitors.

Lord RIDDELL, who proposed the toast of "The Profession and Industry of Chemistry," said he was pleased to hear that the chemical industry in Great Britain was now in a much superior position to what it was before the war, and that there was far greater unity in it than was formerly the case. The record of Great Britain in regard to new discoveries was a glorious one, and there was no class of man with a brighter mind than the Briton. He wished the chemical trade and all the producing trades great success, because, if they were doing well, then the country would do well.

Mr. ROSCOE BRUNNER, replying to the toast, said that more brains were now being put into the chemical industry than had ever been the case; and in respect to greater unity, the Chemical Industry Club was expected to play an important part. The industry had need of the research chemist; it had need of the works chemist; it had need of the chemical engineer; and it had need of the metallurgist. It was hoped that all these would come together through the medium of the Club, and co-operate for the benefit of the industry and the country.

Brigadier-General Sir WILLIAM ALEXANDER, proposing "The Chemical Industry Club," said that, while Great Britain played the most prominent part in all great inventions, yet development work after invention was equally necessary; and if we paid attention to this in the future, and gave the brains of our young men a chance, we should reap the reward of our inventions, instead of allowing other countries to take them away from us, as we had so often done in the past. He hoped the Chemical Industry Club would be a place where the members of the industry could not only go for recreation, but also to discuss business propositions.

Sir WILLIAM POPE, F.R.S., who replied, said he believed the Club would play a very important part in pulling together all the chemical interests in this country.

Mr. C. S. GARLAND, who proposed "The Guests," was received with prolonged applause, in acknowledgment of his recent election as a Member of Parliament.

Mr. GORDON CRAIG emphasized the point that the Club desired to get as members every class of chemist, so that they could all meet and discuss their own particular points of view, and thus assist in overcoming some of the misunderstandings which sometimes existed between the various sections of industry.

The Glasgow Corporation Gas Department have decided to erect workshops at Maxwell Road. Plans have been approved, and an early start will be made by the builders.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 4.

The pitch situation on the London market is unchanged; the minimum price still being 125s. net per ton f.o.b. at makers' works. There is some talk of prices being easier in the Provinces, in consequence of merchants having lowered their limits. At the present time, the value of pitch is governed by the abnormally small production; and although it is understood that recently there has been some increase in the output of tar, it is doubtful whether that improvement is sufficient to have any material effect on the price of pitch. Creosote remains in a strong position at about 8½d. net per gallon in bulk at makers' works. There is a large inquiry for this product. Other products are unchanged.

Tar Products in the Provinces.

Dec. 4.

The average values for gas-works products during last week were: Gas-works coal tar, 65s. to 70s. Pitch, East Coast, 110s. to 112s. 6d. f.o.b. West Coast—Manchester, 105s. to 107s. 6d.; Liverpool, 106s. to 108s. 6d.; Clyde, 107s. 6d. to 110s. Benzole 90 p.ct. North, 1s. 9d. to 1s. 10d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 2½d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 10d. to 1s. 11d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6½d. to 6⅝d.; salty, 6d. to 6½d. Scotland, 5½d. to 5⅝d. Heavy oils, in bulk, North, 6½d. to 6⅝d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 7d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

This market has remained strong generally, with special strength in pitch. Continental business is still of good proportions, and prices have reached £6 per ton f.o.b. East Coast ports. London is 5s. cheaper. Elsewhere, considerable irregularity would seem to prevail, if one may judge by quotations, which range from 80s. to 105s. per ton. If there is any next-best feature, it is probably found in carbolic acid; 40 p.ct. crystals, at 7d. per lb., being in very good demand for export. There is no change in crude 60's at 2s. 1d., or cresylic acid at 2s. 4d. to 2s. 6d. per lb. Solvent naphtha is still wanted in the rubber manufacturing industries, and values are inclined to advance from current level of 2s. 3d. per gallon. Benzole and toluole are steady. Intermediate products are comparatively without change.

Sulphate of Ammonia.

There is nothing fresh to report here, although there is continued good business on export account. This is a feature that must continue, having in mind the world-wide shortage. Our home production, however, will probably show signs of increasing with the turn of the year, but not to such an extent as to affect the position of home consumers, who will certainly have to pay more in the new year.

Gas Lighting in Theatres.

On Sept. 1 last, an Act passed by the General Assembly of the State came into operation in Providence (R.I.) to regulate the lighting of certain buildings, which it is thought had its origin in an interruption of the electrical service on one occasion last winter. The main clause stipulates that—"In all theatres now or hereafter erected or used which are ordinarily lighted by electricity, there shall be, in addition to such ordinary methods of lighting, an independent means of lighting which shall be gas from a commercial gas distributing system, a storage battery system, controlled either automatically or from a central switch located in the lobby or front of the theatre, or such other system or means of lighting as shall be approved by the City Council of Providence. . . . In case such lighting system shall be gas, at least two lights on each side of the main body of the theatre and one on each side of all balconies, as well as a sufficient number of additional lights to illuminate the stairways, hallways, and lobbies shall be kept burning at all times when such theatre is open to the public." It was felt that gas lighting was the only solution for conforming to the requirements of the Act, and there was practically unanimous agreement that gas lighting should be used. The "American Gas Journal" says the enforcing of the Act is in the hands of the Police Department, and the installing of the emergency system had to meet with the approval of the City Engineer, who is a competent electrical engineer and heartily approved of the use of gas lighting as the most satisfactory emergency lighting—all points of the case considered. The Welsbach Company and the local Gas Company co-operated in solving the problem of the fixtures to be used; and the theatre managers are much pleased with the results that they are getting, and the low cost of installation.

Gas Charges at Pershore.—At a meeting of the Lighting Committee of the Pershore Council, Mr. Couper raised the question of charges by the Gas Company, which he said were excessive. They were not justified in paying more as a Committee than they would as private individuals. The Rev. J. Dolphin asked if they could find other means of lighting the town, especially at Christmas; but the Chairman said the time was too short. He (the Chairman), however, thought that if the Gas Company did not come to some reasonable agreement, the Committee must consider other means of lighting the town. It was unanimously decided not to take the initiative in re-opening the question with the Gas Company.

TRADE NOTES.

Tar Dehydrating Plant for Inverness.

The Gas Committee of the Inverness Town Council have accepted estimates from the Chemical Engineering and Wilton's Patent Furnace Company, Limited, for the supply of tar dehydrating plant, with an extra condenser for the manufacture of creosote.

"A. & M." Controllers.

Owing to the continued satisfactory working of the "A. & M." pressure wave automatic controllers, the City of Leeds have decided to instal an additional 900. A like reason has decided the Stockport Corporation to instal a further 125 controllers of a similar type.

The Bezant Continuous Gas Sampler.

It may interest gas engineers to know that the continuous gas sampler mentioned in the paper recently read by Mr. John Terrace, Chief Engineer of the South Suburban Gas Company, before the Southern Association of Gas Engineers and Managers, on "The 'Electro' Flow Meter," can be obtained from Messrs. S. H. Flood & Co., Ltd., 103, Cannon Street, London, E.C.

Stein Silica and Firebrick.

A copy has been received of a cloth-bound catalogue in English from Messrs. John G. Stein and Co , Ltd., silica and firebrick manufacturers, Bonnybridge, Scotland; but at the same time it should be pointed out that the firm are prepared to send on application catalogues in French, German, Italian, Spanish, or Russian. Their "Thistle" and "Stein" brand firebricks, "J. G. S. and Co." special quality semi-silica bricks, and "Bluebell" silica bricks are widely known. The business was started in 1887 with an output of 5000 bricks per day; and since that time the works have been steadily extended, and new plants laid down, until now the total capacity is 1,000,000 bricks per week, in addition to ground fireclay, ganister, and silica cement. Approximate weights are given, and various other particulars which will be of assistance to users. Emphasis is laid upon the importance of all 95 p.ct. silica bricks being stored under cover. A short illustrated description is included of the firm's new brickworks at Castlecary.

Northampton and the Therm System.—The Northampton Corporation Parliamentary Committee have resolved that a protest be made against the granting of the Gas Company's application to the Board of Trade for an Order under section 1 of the Gas Regulation Act, on the ground that the proposed change affecting charges would operate to the disadvantage of consumers, and, further, that no evidence has been adduced to show that the proposed Order will not prejudice the consumers.

At the Doncaster Corporation Gas-Works last week, William Henry Sonley, fitter's labourer, lost his life by being caught in the revolving shafting of some machinery. He was released as quickly as possible, but was found to be dead.

The Brodsworth Gas Company have agreed on a reduction of 6d. per 1000 c.ft., as from Jan. 1, in the price of gas supplied to various areas in the South Yorkshire colliery districts.

Messrs. Alder & Mackay, Ltd., announce that their sole London address, both as regards offices and works, will now be: Douglas Street Works, Douglas Street, Westminster, S.W. 1.

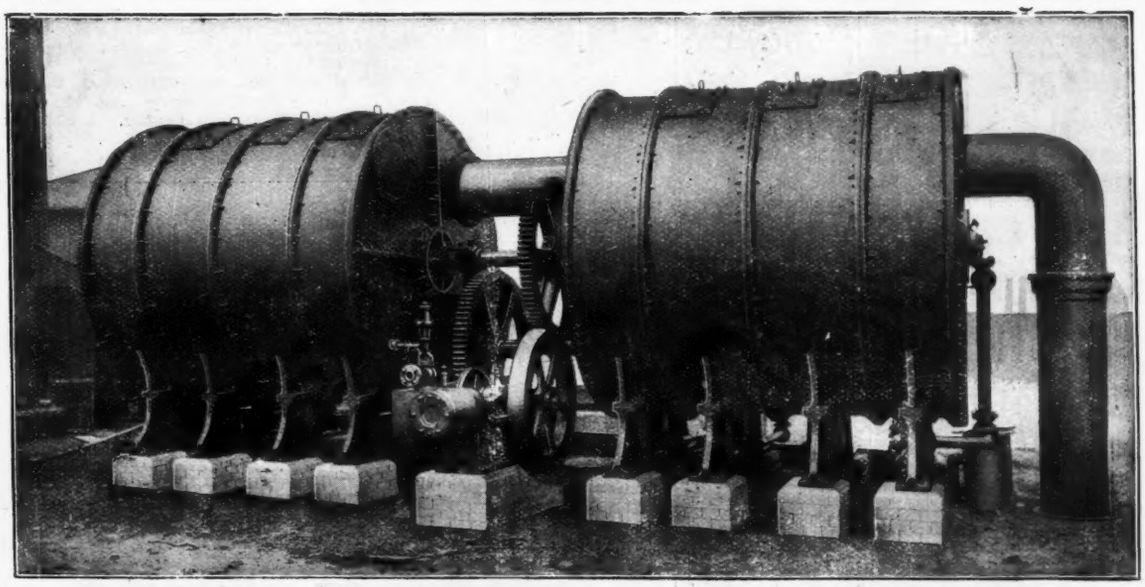
Alterations to the purifying plant at the Barrow Corporation Gas-Works in Hindpool Road have caused a temporary spreading over the town of sulphurous odours which puzzled, as well as irritated, the population for a while, and have since created a "storm in a teacup" of indignation. But, if the people want good gas, they must allow the plant to be put into the best possible condition.

"The World's Work" has started a campaign dealing with the smoke nuisance and its abatement. The first article, appearing in the December number, is written by Dr. des Voeux, the Hon. Treasurer of the Coal Smoke Abatement Society, and deals with the founding of the Society, its early struggles, recent successes, and future work. The article in the January number will be by Dr. Owens.

A growing demand for space at Wembley is reported by the British Empire Exhibition authorities. Inquiries and definite applications from intending exhibitors have increased considerably during the past three or four weeks. As the exhibition is being planned on a scale far greater than that of any previous exhibition held in this country—Empire or international—it has not yet been found possible to allocate any definite area to a particular trade or educational section. Committees of experts are at work (including one on gas), organizing a complete representation of the various industries or sections for which they are responsible. These Committees will also recommend to the Executive Council the allotment of space within their particular sections. The exhibition is to take place in 1924; and one of the groups is for lighting, heating, and ventilation.

Established only a few months since, the Chiswick Meter and Engineering Works, situated at Strand-on-the-Green, and of which Mr. James Dougall is the principal, has made satisfactory strides, and is now finding employment for many more men than at the commencement. To celebrate its inauguration, a dinner was held at the Steam Packet Hotel, when Mr. Dougall presided over what proved to be a very jolly and united gathering, indicative of the general spirit prevailing throughout the works. Acknowledging the toast of "Success to the Firm," Mr. Dougall said this success had been due to three reasons. In the first place, to the support he had received from friends in the gas industry; secondly, to the excellent work turned out by what he considered the highest skilled men of the trade; and, thirdly, the use of the best material it was possible for him to secure.

ROTARY SCRUBBER WASHERS



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STOCK MARKET REPORT.

THE Stock Exchange has had a somewhat mixed week, but anyway better than its predecessor. The opening was dull and very quiet; but things on Tuesday began to rally a little, and maintained the recovery up till Friday, when they partially relapsed. In the gilt-edged market, Home Governments (other than bonds) held their own; the big four on Friday marking: Consols 56¼ 57, War Loan 99½ 99$\frac{15}{16}$, Funding 86⅝ 87, Victory 89⅛ 89½. Home Rails were in demand, and Argentines did well until stopped by profit-snatching. The Foreign Market was irregular; but Brazilian and Chinese were firm.

Business in the Gas Market was quite up to the average in point of volume and fairly well distributed. The tone was quite firm; all changes in quotation being once more in the upward direction. The London Companies were active and steady, and Gas Light ordinary rose 1. In the Suburban and Provincial group, Southampton debenture rose 7, and Newcastle Consols ½. In the Continentals, Imperial and Europeans were unchanged; but Union preference rose 2 in view of the approaching dividend. In the remoter world, Oriental rose 1½ *ex div.*; Primitiva ordinary and preference shares were steady.

The following transactions in gas during the week were recorded: On Monday, Alliance and Dublin, 62½, 62⅝, Brighton and Hove original 167, ditto "A" 123½, British 7 p.ct. preference 10½, 10$\frac{3}{16}$, 10⅜, 10⅝, Croydon sliding-scale 99½, 100, European 9$\frac{8}{32}$, 10, Gas Light ordinary 94, 94¼, 94⅜, 94½, 94⅝, 94¾, 94⅞, ditto 3½ p.ct. maximum 62½, 63½, ditto 4 p.ct. preference 78, 79, ditto 3 p.ct. debenture 61½, 62, Imperial Continental 151, 151¼, 152, Primitiva 5 p.ct. preference 43s. 9d., 46s. 3d., San Paulo 6 p.ct. preference 5⅛, South Metropolitan 95⅜, South Suburban 98, Southampton 81½, Tottenham "B" 100⅜, Brighton and Hove 4 p.ct. debenture 75, Gloucester ordinary 81½, Southend 5 p.ct. new "B" 70½, Colonial ordinary 14s. 9d., ditto 7 p.ct. preference 14s. 7½d. On Tuesday, Alliance and Dublin 62, Brentford "A" 100⅜, Brighton and Hove "A" 123½, European 9⅜, Gas Light ordinary 94½, 94⅜, 94⅝, 95, 95⅛, 95½, ditto 3½ p.ct. maximum 62½, 63½, ditto 4 p.ct. preference 78½, 80, Imperial Continental 150½, Primitiva 12s. 9d., 14s. 9d., South Metropolitan 95⅜, 96½, 96⅝, ditto 5 p.ct. preference 95½, Tottenham "B" 100⅜ Swansea 7 p.ct. preference 104, 104½, ditto 6½ p.ct. debenture 104, 104⅜, Barnet "A" 119½, 120½, ditto "C" 118, 119, ditto "D" 85½, 86, Folkestone 77, 77½, Southend 5 p.ct. new "B" 71, ditto 7 p.ct. maximum 104½, Colonial 15s., ditto 7 p.ct. preference 14s. 10½d. On Wednesday, Alliance and Dublin 62½, Bombay 96s. 3d., Brentford "A" 100½, 101½, ditto 4 p.ct. debenture 77½, Brighton and Hove original 162, ditto "A" 124½, Bristol 92, Commercial 3½ p.ct. 94½, Continental Union 29, ditto 7 p.ct. preference 55, Croydon max. div. 81, European 9⅜, Gas Light ordinary 95, 95⅛, 95⅜, 95½, 95⅝, 95⅞, ditto 3½ p.ct. maximum 62½, Imperial Continental 151, Newcastle 78¾, Primitiva 5 p.ct. preference 45s., ditto 4 p.ct. debenture (1911) 55⅜, South Metropolitan 95, 95⅛, 95⅜, Tottenham 100½, Wandsworth 3 p.ct. debenture 58½, Barnet "A" 119, Brighton and Hove 4 p.ct. debenture 75½. On Thursday, Commercial 3½ p.ct. 94½, Continental Union 29, ditto 7 p.ct preference 57, Gas Light ordinary 95, 95⅛, 95½, 95⅞, ditto 4 p.ct. preference 79½, Oriental *ex div.* 98, 98½, Primitiva 4 p.ct. debenture 70, 70½, South Metropolitan 95½, 96⅛, 96⅜, 96½, Tottenham "A" 114, 114½, ditto "B" 100⅜, 101½, Swansea 7 p.ct. preference 104⅜, Croydon 7 p.ct. debenture 102, South Suburban 7 p.ct. debenture 102, Hornsey 5 p.ct. preference 90½, 90⅜, East Hull 5 p.ct. maximum 78⅜. On Friday, Alliance and Dublin 63½, Bombay 95s., Bournemouth "B" 11$\frac{7}{16}$, 11⅛, ditto 4 p.ct. debenture 75, British 33, Croydon sliding-scale 101½, ditto 7 p.ct. debenture 103, Gas Light ordinary 95, 95⅛, 95⅛, 95⅛, 95⅝, 96, 96⅛, ditto 4 p.ct. preference 78½, Imperial Continental 150, 152, Primitiva 5 p.ct. preference 45s., 45s. 6d., South Metropolitan 95s., 95⅛, 95⅛, 95⅝.

In the Money Market there was considerable activity. The demand was brisk and rates well maintained; but the position became more comfortable before the close. Discount rates were similarly steady almost up to the close. Silver continued cheap. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	68—73	...
1,551,868	,,	Oct. 5	2½	5%	Alliance & Dublin Ord.	59—64	62—67	62—63⅛
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	Oct. 19	7½	4/-	Bombay, Ltd.	5⅛—6⅛	4½—5	95/—96/3
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water: 5 p.c.	..	11—12	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	11—12	11$\frac{7}{16}$—11⅛
115,000	10	,,	6	6%	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8½—9½	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	73—78	75
992,045	Stk.	July 27	14	6/-	Brentford A Consolid.	261—266	100—103	100⅛—101⅛
734,920	,,	,,	11	6/3	Do. B New	204—209	100—103	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	77½
214,775	,,	Aug. 24	11	11%	Brighton & Hove Orig.	208—213	165—170	162—167
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—125	123½—124½
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	72
530,000	20	Oct. 5	12½	22/6	British	44—45	32—34	33
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	55—60	...
100,000	10	Nov. 2	—	—	Cape Town & Dis., Ltd.	1⅛—2⅛	6⅛—7⅛	...
100,000	10	Oct. 19	—	—	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 29	4½	—	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
137,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	...
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	93—98	94½
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	29—34	29
200,000	,,	,,	7	3%	Do. 7 p.c. Pref.	115—118	53—58	55—57
660,009		Sept. 1	—	6%	Croydon sliding scale.	..	96—101	99⅛—101½
284,975		,,	—	5%	Do max div.	..	80—85	81—82
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	9½—10⅛	9⅝—10
16,298,975	Stk.	July 27	4/17/4	52/-	Gas: 4 p.c. Ord.	98—102	95—97	94—96½
2,600,000	,,	,,	3½	35/-	Gas: 3½ p.c. max.	76—79	61—64	62½—63½
4,062,235	,,	,,	4	4%	Light and Coke: 4 p.c. Con. Pref.	96—99	76—81	78—80
4,674,850	,,	June 15	3	3%	Light and Coke: 3 p.c. Con. Deb.	72½—74½	61—64	61½—62
130,000	,,	Dec. 11	10	10%	Light and Coke: 10 p.c. Bonds	..	..	..
—	—	—	—	—	Light and Coke: 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	77—80	...
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16⅝	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132	...
1,976,000	,,	Nov. 16	9	£5	Imperial Continental	150—160	150—155	150—152
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	73—76	...
235,242	,,	July 27	6½	9½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	...
165,736	,,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean Met. of Melbourne 4½ p.c. Deb.	4⅛—4⅜	3⅛—4	...
250,000	100	Oct. 2	4½	4½%		99—101	89—96	...
341,920	Stk.	Nov. 30	4	4%	Monte Video, Ltd.	11½—12	58—63*	...
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	79—81	78⅛
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	69—71	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Aug. 24	7/14/0	7/8⅜	,, ,, 7 p.c.	14—15	10⅛—11⅛	...
500,000	Stk.	Nov. 30	8	8%	Oriental, Ltd.	117—122	95—100*	98—98½
60,000	5	—	10	—	Ottoman, Ltd.	7⅛—7½	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90	...
249,980	5	—	8	—	Primitiva Ord.	5⅛—6	$\frac{15}{16}$—1⅛	12/9—14/9
499,960	5	—	5	—	Do. 5 p.c. Pref.	4⅛—5	2$\frac{1}{16}$—2⅛	43/9—46/3
321,600	100	Nov. 30	4	4%	Do. 4 p.c. Deb.	91—93	68—73*	70—70½
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	55½
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	...
150,000	10	Sept. 21	6	6/-	San Paulo: 6 p.c. Pref.	10⅛—11	5⅛—6	5⅞
125,000	50	July 3	5	5%	San Paulo: 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	97—99	...
209,984	,,	,,	10	5%	Do. B	222—224	97—99	...
523,500	,,	,,	10	5%	Do. C	220—222	97—99	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	Nov. 2	9	7%	South African	10⅛—11⅛	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	95—97	95—96⅛
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	95—97	95⅜
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64	...
224,820	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	106—108	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100	98
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
647,740	,,	Nov. 2	5	7%	Southampton Ord.	99—102	77—82	81½
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	70—75	...
120,000	,,	July 27	—	7½%	Tottenham: A 5 p.c.	135—138	112—117	113—114½
782,273	,,	,,	6	6%	Tottenham: B 3½ p.c.	115—117	100—103	100⅛—101⅛
181,255	,,	June 15	4	4%	Tottenham: 4 p.c. Deb.	87—89	75—80	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	⅛—⅜	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	20—30	...
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	79—81	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8½	72/6	Wandsworth A 5 p.c.	151—156	111—115	...
855,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	...
108,075	,,	,,	—	50/9	Do. C.	..	87—92	...
140,865	,,	,,	—	50/9	New Ordinary	..	87—92	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	...
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	...
88,416	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	58½

* Ex Div.

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